

# RADIO & TELEVISION NEWS

DECEMBER

1952

23 CENTS

16 Pages 400

**TV & RADIO  
ENGINEERING**

IN THIS ISSUE

FACTORS OF THE

THE "BROADCAST"

"THE PINKET"

A NEW BROADCAST

APPROXIMATE

FLUORESCENT SYSTEM

HOW YOUR DESK

WORKS IN THE

THE "BROADCAST"

THE "BROADCAST"

THE "BROADCAST"

THE "BROADCAST"

THE "BROADCAST"

(Cover Photo: 27)



# A serviceman's *"best friend"* is an **RCA Tube**

An RCA Tube starts working for you from the instant the customer first sees the familiar red, black, and white carton. You have her confidence from the start, because she knows and respects the RCA trademark.

But the big payoff to you begins when the tube goes to work. For, experience has proven that the superior quality of RCA Receiving Tubes and Kinescopes is your best measure of protection against premature tube failures. With RCA Tubes, you can be sure the job is well done.

Helping you to safeguard your reputation is a vital, everyday service of RCA Tubes. And that protection is yours at no extra cost.



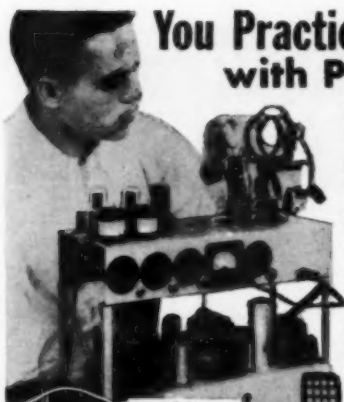
**UNLOCK  
THE DOOR TO  
BIGGER  
PROFITS**

Here's *your* key to better business... RCA's dynamic Dealer Identification Program. Ask your **RCA Tube Distributor** for your copy of the colorful, 16-page booklet "A Magic Pass-Key to Customer Confidence." It tells you how you can become a Registered Dealer... and get *extra* sales benefits.



**RADIO CORPORATION of AMERICA**  
ELECTRON TUBES

HARRISON, N. J.

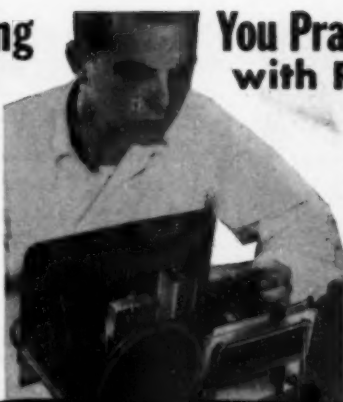


## You Practice Broadcasting with Parts I Send

As part of my Communications Course I send you kits of parts to build the low-power Broadcasting Transmitter shown at left. You use it to get practical experience putting this station "on the air," performing procedures demanded of broadcasting station operators. Training plus opportunity is the PERFECT COMBINATION for job security, good pay, advancement. An FCC Commercial Operator's License can be your ticket to a better job and a bright future and my Communications Course gives you the training you need to get your license. Mail coupon below and see in my book other valuable equipment you build. All equipment I send is yours to keep.



J. E. Smith  
has trained more men  
for Radio-TV  
than any other man



## You Practice Servicing with Parts I Send

Nothing takes the place of PRACTICAL EXPERIENCE. That's why NRI training is based on LEARNING BY DOING. You use parts I furnish to build many circuits common to both Radio and Television. With my Servicing Course you build the modern Radio shown at left. You build an electronic Multitester which you use to help fix sets while training at home. Many students make \$10, \$15 a week extra fixing neighbors' sets in spare time, starting soon after enrolling. I send you special booklets that show you how. Mail coupon for my big 64-page book and actual Servicing Lesson, both FREE. See other equipment you build and keep.

# I Will Train You at Home to be a RADIO-TELEVISION Technician

## TELEVISION Today's Good Job Maker

TV now reaches from coast-to-coast. Over 25 million TV sets are now in use; about 200 TV stations are on the air; hundreds more being built. This means more jobs, good pay jobs with bright futures. Now is the time to get ready for success in TV. Find out what Radio-Television offers you. Mail coupon now for my 2 Books FREE!



## America's Fast Growing Industry Offers You Good Pay, Success

Do you want a good pay job, a bright future, security? Then get into the fast growing RADIO-TELEVISION industry. Hundreds I've trained are successful RADIO-TELEVISION TECHNICIANS. Most had no previous experience, many no more than grammar school education. Keep your job while training at home. Learn RADIO-TELEVISION principles from easy-to-understand lessons. Get practical experience on actual equipment you build with parts I send you.

### Make Extra Money in Spare Time While Training

The day you enroll I start sending you SPECIAL BOOKLETS that show you how to service neighbors' Radios in spare time while training. Use MULTITESTER you build to help service sets, get practical experience working on circuits common to both Radio and Television. Find out how you can realize your ambition to be successful in the prosperous RADIO-TELEVISION industry. Even without Television, the industry is bigger than ever before. 115 million home and auto Radios, over 3000 Radio Stations, expanding Aviation and Police Radio. Micro-wave Relay, FM and Television are making opportunities for Servicing and Communications Technicians.

### Mail Coupon — Find Out What Radio-TV Offers You

Send for my FREE DOUBLE OFFER. Cut out and mail coupon below. Send in envelope or paste on postal. You will get actual Servicing Lesson to prove it's practical to learn at home. You'll also receive my 64-page Book, "How to Be a Success in Radio-Television." Read what my graduates are doing, earning, see photos of equipment you practice with at home. J. E. Smith, President, Dept. 3NE  
National Radio Institute, Washington 9, D. C.

## Good for Both—FREE

MR. J. E. SMITH, President, Dept. 3NE  
National Radio Institute, Washington 9, D. C.  
Mail me Sample Lesson and 64-page Book,  
FREE. (No salesmen will call. Please  
write plainly.)

Name ..... Age .....  
Address .....  
City ..... Zone ..... State .....

VETS write in date  
of discharge

The ABC's of  
SERVICING

How to Be a  
Success  
in RADIO-  
TELEVISION

## I TRAINED THESE MEN



### Has Growing Business

"I am becoming an expert Teletician as well as Radiotician. Without your practical course I feel this would have been impossible. My business continues to grow." —Philip G. Brogan, Louisville, Ky.

### Good Job with Station

"I am Broadcast Engineer at WLPM. Another technician and I have opened a Radio-TV service shop in our spare time. Big TV sales here. As a result we have more work than we can handle." —J. H. Bangley, Jr., Suffolk, Va.

### Praises NRI as Best Course

"I was a high school student when I enrolled. My friends began to bring their Radios to me. I realized a profit of \$300 by the time I completed the course." —John Hopper, Nitro, West Va.

AVAILABLE  
to all qualified  
**VETERANS**  
UNDER G. I. BILLS

## NRI Training Leads to Good Jobs Like These



Broadcasting: Chief Technician, Chief Operator, Power Monitor, Recording Operator, Remote Control Operator. Servicing: Home and Auto Radios, P.A. Systems, Television Receivers, Electronic Controls, FM Radios. In Radio Plants: Design Assistant, Transmitter Design Technician, Tester, Serviceman, Service Manager. Ship and Harbor Radio: Chief Operator, Assistant Operator, Radiotelephone Operator. Government Radio: Operator in Army, Navy, Marine Corps, Coast Guard; Forestry Service Dispatcher, Airways Radio Operator. Aviation Radio: Transmitter Technician, Receiver Technician, Airport Transmitter Operator. Television: Pick-up Operator, Voice Transmitter Operator, Television Technician, Remote Control Operator, Service and Maintenance Technician.



Tested Way to Better Pay

RADIO & TELEVISION NEWS is published monthly by the Ziff-Davis Publishing Company at 64 E. Lake St., Chicago 1, Ill. Entered as second-class matter, July 21, 1948, at the Post Office, Chicago, Ill., under the act of March 3, 1879. Authorized by Post Office Department, Ottawa, Canada, as second-class matter. SUBSCRIPTION RATES: Radio & Television News—one year, U. S. and Possessions, Pan-American countries, and Canada \$4.00; all other foreign countries \$5.00; Radio-Electronic Engineering Edition—one year, U. S. and Possessions, Pan-American countries, and Canada \$6.00; all other foreign countries \$7.00. Postmaster—Please return undelivered copies under form 3589 to 64 E. Lake St., Chicago 1, Ill.

Editor and Asst. Publisher  
**OLIVER READ, D.Sc., WITI**

Managing Editor  
**WM. A. STOCKLIN, S.S.**

Technical Editor  
**H. S. RENNE, M.S.**

Service Editor  
**CHARLES TEPPER**

Assistant Editors  
**P. B. HOEFER**  
**M. C. MAGNA**

Television Consultant  
**WALTER H. BUCHSBAUM**

Short-Wave Editor  
**KENNETH R. BOORD**

Art Editor  
**FRANK SAYLES**

Draftsman  
**A. A. GANS, W2TSP**  
**J. A. GOLANKE**

Advertising Manager  
**L. L. OSTEN**

Midwest Adv. Manager  
**JOHN A. RONAN, JR.**

Western Adv. Manager  
**JOHN E. PAYNE**



COVER PHOTO: Mimi Benzell, world-famous singer, and husband, Walter Gould, with newly-acquired music system Record changer (Garrard), tuner (Pilot), amplifier (Bogen), speaker (University) enclosure (Cabinart) and the tape recorder (Wilcox-Gay). Ektachrome by J. Seymour

#### ZIFF-DAVIS PUBLISHING COMPANY

Chairman of the Board and Publisher  
**WILLIAM B. ZIFF**

President  
**B. G. DAVIS**

Vice-Presidents  
**H. J. MORGANKOTH**

**M. H. FROELICH**

Secretary-Treasurer  
**G. E. CARNEY**

#### BRANCH OFFICES

CHICAGO (1)

44 E. Lake St., AN 3-5200

LOS ANGELES (14)

Stanton Center, 900 Wilshire Blvd., Mich. 9855

## First in radio- television-audio-electronics

Average Paid Circulation over 230,000

Radio News Trademark Reg. U. S. Pat. Office • Television News Trademark Reg. U. S. Pat. Off.

# RADIO & TELEVISION NEWS

DECEMBER, 1953

## CONTENTS

A Simple Facsimile System for the Amateur.....	William L. Roberts	45
TV Servicing in the Home.....	Richard Blitzer	49
Pages from a Tape Editor's Notebook (Part 2).....	Donald C. Hoefler	50
The "Compleat Fidelity" (Part 2).....	Don V. R. Drenner	52
A Dual Channel Recording System (Part 2).....	Oliver Read	53
The Purist—A Non-Corner Horn.....	Edward J. Gately, Jr. & Thomas A. Benham	56
Servicing TV Low Voltage Supplies.....	Milton H. Lowe	58
Reviving the Jam-Jar Rectifier.....	Elbert Robberson	61
The CBS-Colortron.....	Robert B. Tomer & Wm. R. Sullivan	62
Troubleshooting the U.H.F. Tuner.....	Walter H. Buchsbaum	64
Inexpensive Applause Meter.....	Basil C. Barbee	67
A 220 mc. R.F. Amplifier.....	Leroy W. May, W5AJG	68
Certified Record Revue.....	Bert Whyte	70
Music in Every Home.....		71
Mac's Radio Service Shop.....	John T. Frye	72
Know Your 1954 Westinghouse TV Receivers.....	W. L. Wright	73
A Plug-In Modulator.....	Everett G. Taylor, W8NAF	77
The "Electronorgan" (Part 2).....	Richard H. Dorf	78
Electronic Light Control.....	Henry A. Setzke, W9LFZ	81
The Transistor D.C. Amplifier.....	Herbert F. Starke	82
The Regency U.H.F. Converter.....	R. A. Morris	84
Foolproof 2-Band Transmitter.....	William Bruce Cameron, W8IVJ	116
Radio-TV Service Industry News.....		132
Improved 10-Meter Mobile Antenna.....	Lt. Col. Byron E. Hargrove, W4BSO	172
Service Hints on Westinghouse TV Sets.....		178
Radio & Television News Index (Vols. 49-50).....		183

## DEPARTMENTS

For the Record.....	The Editor	8	Technical Books.....	88
Spot Radio News.....		16	What's New in Radio.....	102
Within the Industry.....		35	Manufacturers' Literature.....	152
Short-Wave.....	K. R. Boord	86	New TV Products.....	162



COPYRIGHT 1953  
(All Rights Reserved)  
**ZIFF-DAVIS PUBLISHING COMPANY**  
Editorial and Executive Offices  
366 Madison Ave., New York 17, N. Y.  
VOLUME 50 • NUMBER 6



Member  
Audit Bureau of  
Circulations

SUBSCRIPTION SERVICE: All communications concerning subscriptions should be addressed to Circulation Dept., 64 E. Lake St., Chicago 1, Ill. Subscribers should allow at least four weeks for change of address.

CONTRIBUTIONS: Contributors are advised to retain a copy of their manuscripts and illustrations. Contributions should be mailed to the New York Editorial Office and must be accompanied by return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to whatever adaptations and revisions are necessary to meet the requirements of this publication. Payment covers all author's, contributor's, and contestant's rights, title, and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

RADIO & TELEVISION NEWS

**NOW... GET EVERYTHING YOU  
NEED TO LEARN AND MASTER**

# TELEVISION

**RADIO-ELECTRONICS  
...AT HOME!**

**Use REAL commercial-type equip-  
ment to get practical experience**

Your future deserves and needs every advantage you can give it! That's why you owe it to yourself to find out about one of the most COMPLETE, practical and effective ways now available to prepare AT HOME for America's billion dollar opportunity field of TELEVISION-RADIO-ELECTRONICS. See how you may get and keep the same type of basic training equipment used in one of the nation's finest training laboratories... how you may get real STARTING HELP toward a good job or your own business in Television-Radio-Electronics. Mail the coupon today for complete facts—including 89 ways to earn money in this thrilling newer field.

**D. T. I., ALONE, INCLUDES BOTH MOVIES and HOME LABORATORY** In addition to easy-to-read lessons, you get the use of HOME MOVIES—an outstanding training advantage—plus 16 big shipments of Electronic parts. Perform over 300 fascinating experiments for practical experience. Build and keep real commercial-type test equipment shown at right.

**Get information packed  
publication FREE!**

#### MODERN LABORATORIES

If you prefer, get all your preparation in our new Chicago Training Laboratories—one of the finest of its kind. Ample instructors, modern equipment. Write for details!

#### MILITARY SERVICE

If you're subject to military service, the information we have for you should prove very helpful. Mail coupon today.

**89 WAYS  
TO  
EARN  
MONEY  
IN TELEVISION  
RADIO-ELECTRONICS**

**ACT NOW! MAIL COUPON TODAY!**

**DEFOREST'S TRAINING, INC.**  
2533 N. Ashland Avenue, Chicago 14, Ill.

BN-12-J

I would like your valuable information-packed publication showing how I can get started toward a good job or my own business in Television-Radio-Electronics.

Name..... Age.....  
Street..... Apt.....  
City..... Zone..... State.....

**21 INCH**

Build and Keep this BIG DTI Engineered TV set — easily converted to U.H.F. (DTI offers another Home Training, but without the TV set.)

**Here's the REAL THING!**

**SET UP YOUR OWN  
HOME LABORATORY**



Multimeter



Oscilloscope

HOME  
MOVIES



**DEFOREST'S TRAINING, INC.**

AFFILIATED WITH

**DEVRY Technical INSTITUTE**

CHICAGO 14, ILLINOIS

# NO.1 CHOICE

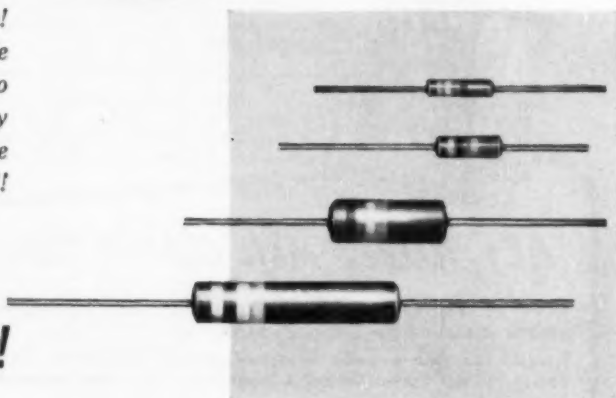
of **ALL** Fixed Composition Resistors by almost

# 3 to 1\*

*\*Not Claims! Not Predictions! But Plain Facts!  
Unbiased, authoritative, independent surveys (made  
regularly since 1930) show IRC BT RESISTORS to  
be the Service Technicians' choice by a continually  
increasing margin. Today, BT RESISTORS are  
preferred over the total of all other brands combined!*

**Ask for IRC BT's...**

**Most Service Technicians Do!**



## INTERNATIONAL RESISTANCE COMPANY

415 N. Broad Street, Philadelphia 8, Pa.

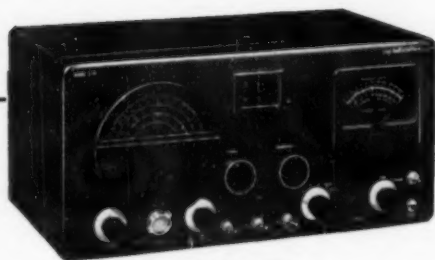
*Wherever the Circuit Says*

*In Canada: International Resistance Co., Ltd., Toronto, Licensee*

Check the specs...

Check performance...

# Then, They'll Choose Hallicrafters



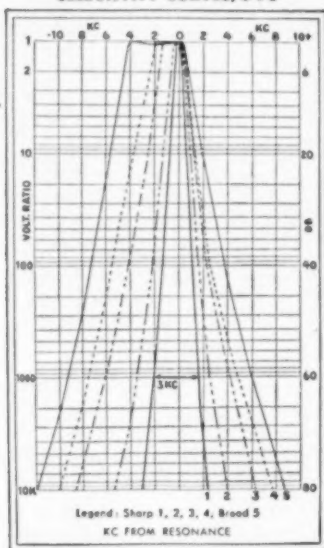
## Model S-76

Double conversion receiver. Broadcast Band 538-1580 kc plus three short-wave bands covering 1720 kc-34 Mc.

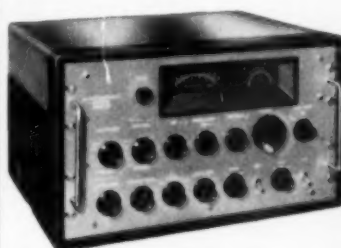
Calibrated electrical bandspread for easy tuning. Double superhet with 50 kc second i-f and giant 4-inch "S" meter. Five position selectivity, one r-f, two conversion, two i-f stages, temperature compensated. 3.2 or 500 ohm outputs.

Satin black steel cabinet. 18½" x 8⅞" x 9½" deep. Nine tubes, voltage regulator, and rectifier. For 105/125 V. 50/60 cycle AC. Use R-46 speaker. . . . \$199<sup>95</sup>

SELECTIVITY CURVES, S-76



Do you know any better way, any other way, to judge SW equipment than to check the specifications and the performance? Frankly that's the only valid way we can think of to make sure you get your money's worth. Check these specs. Take a look at the selectivity curve for the S-76. It is typical of the outstanding value Hallicrafters offers in every price class.



**Model HT-20.** T.V.I. suppressed 100 watt AM-CW transmitter with all spurious outputs above 40 Mc at least 90 db. below full rated output.

All stages metered; single meter with eight position meter switch; output tuning indication. Frequency range of 1.7 Mc to 31 Mc continuous on front panel control. Seven tubes plus five rectifiers.

For 105/125 V. 50/60 cycle . . . . . \$449<sup>50</sup>

**Model SX-71.** Covers Broadcast Band 535-1650 kc plus four short-wave bands covering 1650 kc-34 Mc. and 46-56 Mc.

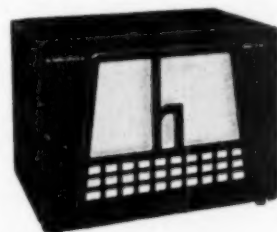
Narrow Band FM one r-f, two conversion, and three i-f stages. Temperature compensated, voltage regulated. Three watt output (terminals for 500 and 3.2 ohms).

Satin black steel cabinet. 18½" x 8⅞" x 12" deep. 11 tubes plus regulator, rectifier. For 105/125 V. 50/60 cycle AC. Use R-46 speaker. \$249<sup>95</sup>



**Model R-46.** Matching 10" PM speaker for use with Hallicrafters communications receivers SX-71, SX-76, SX-73 or SX-62. 80 to 5000 cycle range. Matching transformer with 500-ohm input. Speaker voice coil impedance, 3.2 ohms.

Satin black steel cabinet matches all Hallicrafters receivers. Cloth covered metal grille. 15" x 10⅞" x 10⅞" deep. Ship. wt. 17 lbs. \$24<sup>95</sup>



# hallicrafters

World's Leading Exclusive Manufacturer of Communications and High Fidelity Equipment, Radio and Television

4401 West Fifth Avenue, Chicago 24, Illinois  
Hallicrafters Ltd., 51 Camden Street, Toronto, Canada

Choice of Hi-Fi Enthusiasts!

# E-V RADAX

SUPER-EFFICIENT  
COAXIAL SPEAKERS



**Model SP8-B Radax**  
Super-Eight. Unusual  
bass balance in 8-inch  
coaxial speaker.  
Response 35-13,000 cps  
±6 db. 15-20 watts.  
Imp: 8 ohms. 1 lb.  
Alnico V magnet. 5 1/2"  
depth behind mtg. panel.  
List Price \$47.50  
Audiophile Net. \$28.50



**Model SP12-B Radax**  
Super-Twelve. Full range  
12-inch coaxial  
speaker. Response  
35-13,000 cps ±6 db.  
15-20 watts. Imp:  
8 ohms. 1 lb. Alnico  
V magnet. 6 3/4"  
depth behind mtg. panel.  
List Price \$49.50  
Audiophile Net. \$29.70



**Model SP12 Radax**  
Super-Twelve. Amazing  
lows and highs in 12-  
inch coaxial speaker.  
Response 30-13,000 cps  
±5 db. 25 watts. Imp:  
16 ohms. 3 lb. Alnico  
V magnet. 7 1/2"  
depth behind mtg. panel.  
List Price \$95.00  
Audiophile Net. \$57.00



**Model SP15 Radax**  
Super-Fifteen. Fullst  
range and balance in  
15-inch coaxial speaker.  
Response 30-13,000  
cps. ±5 db. 30 watts.  
Imp: 16 ohms. 3 1/4 lb.  
Alnico V magnet.  
8 3/4" depth behind  
mtg. panel.  
List Price \$130.00  
Audiophile Net. \$78.00

## Enjoy the Range and the Realism

New concepts by E-V create new values for you in the enjoyment of sound reproduction. Unique *Radax* principle and built-in mechanical crossover permit design of the low-frequency cone and high-frequency axial radiator for extended optimum bass and treble response. Heavier "pound-rated" magnets provide more driving power and generous distortion damping factors. These and other E-V quality features assure more listening pleasure.

Hear them at your E-V Distributor  
or Write for FREE Hi-Fi Bulletins

# Electro-Voice

410 CARROLL ST. • BUCHANAN, MICH.  
Export 13 E. 40th St. N.Y. 16, U.S.A. Cable: Arlab

# For the RECORD.

BY THE EDITOR

## NEW HORIZONS FOR INDEPENDENT SERVICE

**B**Y THE TIME this issue is distributed, it is probable that the FCC will have approved a compatible color TV system. The study of color TV is a responsibility for all service technicians who expect to derive any measure of income from this new advance. Service technicians cannot afford to leave their shops in the evening and forget about their profession. Television in company with electronics moves too rapidly. Many changes in circuitry, manufacture, and transmission have occurred since 1947. Service has had to keep abreast of these developments to be successful.

In color TV, the service technician cannot assume that he will learn all he needs to know after he has practiced on a few sets. He may never get the chance to practice on those sets. The man who learns the circuitry involved, and the techniques needed for successful servicing of color, will establish a reputation early and will beat out his competitors. The facts on color TV have been appearing in this magazine, and we will continue to present them in the many articles we have planned for our service readers. Read them, they are for your own good.

Not long ago, Chicago was host to the 4th annual convention of independent service associations, sponsored by the National Alliance of Television and Electronic Service Associations. This 3-day meeting was significant in that it brought together the representatives of many of the manufacturers of television sets and of the parts used in TV repair, and a large number of independent service dealers from different parts of the country.

The number of independent service dealers attending the show was approximately 500—five hundred out of an estimated total of 20,000 service businesses employing upwards of 75,000 service technicians. If the convention was not the total success numerically that it deserved, many things were accomplished for independent service, and those who attended benefited from a variegated group of talks and seminars. In particular, there were seminars on business and sales promotion, stressing how to use many of the promotional items available to service dealers from manufacturers and suppliers. Representatives of the RCA Service Company delivered two stimulating and enlightening talks on color TV and transistors, and there were other interesting lectures on u.h.f., consumer relations, and labor problems in the service shop, by represen-

tatives of *Amphenol*, *General Electric*, and *Chicago Better Business Bureau*.

Without a doubt, whether independent service endorses NATESA or not, a national service organization representing independent service is important in what it can accomplish for service. Such a group can represent the service dealer in his desire for closer cooperation with the set manufacturer in making his sets more serviceable; in eliminating such time-consuming service headaches as tubes which slope forward on the chassis and fit so closely under the picture tube that they cannot be removed for checking unless the picture tube and chassis are removed first. A national organization can strive for better test equipment when necessary—not to mention the legislation that such a group can fight for or against in the interests of independent service.

However, such a group must be truly representative to help all segments of service. To be representative, it must have as many active members or member groups as possible. Many local service associations have preferred to combine into regional alliances, rather than combine on a national basis. Such groups have been formed in Texas, Pennsylvania, New York, Michigan, and a few other states. It is to be hoped that these regional groups will find some basis for cooperation on a national level, for it is becoming more and more apparent that independent service must organize itself for its own betterment, and to oppose the curbs that some pressure groups would force upon it.

## R & TV News Acquires TV & Radio Engineering

In line with our policy of keeping our readers up-to-date on the many facets of radio, television, and electronics, we are happy to announce that we have recently acquired *TV & Radio Engineering*, a magazine which has been authoritatively serving the interests of this rapidly expanding field for many years.

Effective as soon as possible, the *Radio-Electronic Engineering* Edition of *RADIO & TELEVISION NEWS* will incorporate many of the regular features of our new acquisition. You will also find our *REE* Edition greatly expanded to include articles of interest to development and design engineers in TV, AM, and FM broadcasting.

We welcome the regular readers of *TV & Radio Engineering*, and are happy for this opportunity to broaden the scope of our *REE* Edition . . . O.R.

RADIO & TELEVISION NEWS



NEW HOME OF ALLIED RADIO

ultra-modern facilities TO SERVE YOU BEST

**FREE!**

get your  
value-packed

**1954  
ALLIED**

**268-PAGE CATALOG**

The World's Largest Stocks

- TV and Radio Parts
- Test Instruments
- High-Fidelity Equipment
- Custom TV Chassis
- AM, FM Tuners and Radios
- Recorders and Supplies
- P. A. Systems, Accessories
- Amateur Station Gear
- Builders' Kits, Supplies
- Equipment for Industry

Fastest Service in  
Electronic Supply

the only  
**COMPLETE**  
catalog for  
everything in  
TV, Radio and  
Industrial  
Electronics



**Send for it today!**



You'll want the *one* complete Buying Guide to *Everything in Electronics*—268 pages packed with the world's largest selection of quality equipment at lowest, money-saving prices. See all the latest releases in custom TV chassis, TV antennas and accessories; AM and FM tuners and radios; *everything* in High-Fidelity custom components; latest P.A. Systems and accessories; recorders and supplies; Amateur receivers, transmitters and station gear; specialized industrial electronic equipment; test instruments; builders' kits; huge listings of parts, tubes, tools, books—your choice of the world's *most complete stocks* of quality equipment. ALLIED gives you *every* buying advantage: speedy shipment, expert personal help, lowest prices, liberal terms, assured satisfaction. Get the 1954 ALLIED Catalog. Keep it handy—and save time and money. Send for your **FREE** copy today.

**SAVE ON EVERYTHING  
IN ELECTRONICS**

**SEND FOR THE LEADING  
ELECTRONIC BUYING GUIDE**

**free**

#### EASY-PAY TERMS

Use ALLIED'S liberal Easy Payment Plan—only 10% down, 12 months to pay—no carrying charge if you pay in 60 days. Available on Hi-Fi and P. A. units, recorders, TV chassis, test instruments, Amateur gear, etc.

#### TV and HI-FI SPECIALISTS

To keep up with developments in High-Fidelity and TV, look to ALLIED. Count on us for all the latest releases and largest stocks of equipment in these important fields. If it's anything in High-Fidelity or Television—we have it in stock!

ALLIED RADIO CORP., Dept. 1-M-3  
100 N. Western Ave., Chicago 80, Illinois

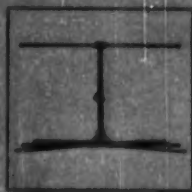
☐ Send FREE 268-Page 1954 ALLIED Catalog

Name

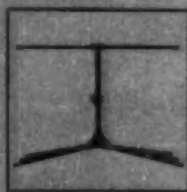
Address

City  Zone  State

# FALCON Introduces -



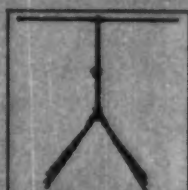
Channels 2-13,  
peaked for low chan-  
nels (2 thru 6)



Channels 2-13, nor-  
mal position, peaked  
for all VHF chan-  
nels (2 thru 13)



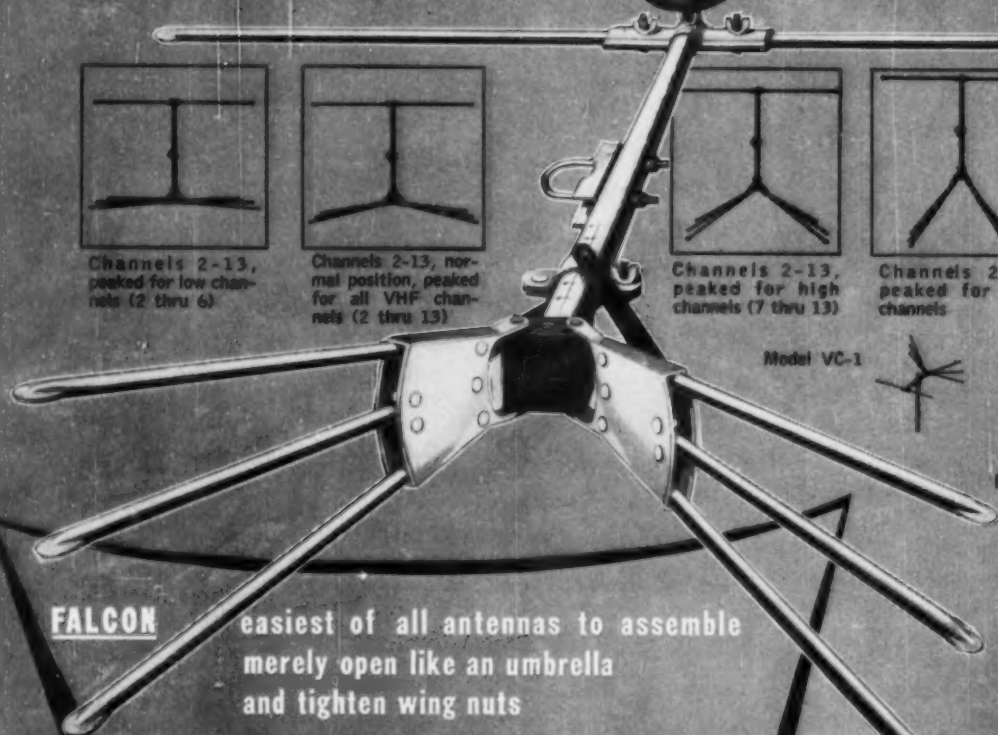
Channels 2-13,  
peaked for high  
channels (7 thru 13)



Channels 2-83,  
peaked for UHF  
channels



Falcon "VARI-CON"  
folded for packing



**FALCON**

easiest of all antennas to assemble  
merely open like an umbrella  
and tighten wing nuts

There is NO ASSEMBLY problem with a FALCON "VARI-CON". It takes longer to explain the operation than to accomplish it! Your FALCON "VARI-CON" comes folded into one compact unit. You need only swing the reflector into position and tighten the wing nuts. Move the sliding sleeve to the calibrated channel setting you desire and tighten. The butterfly springs snap the elements into position and lock them securely. The FALCON "VARI-CON" is ready to install, ready to provide peak performance. Changing the channel peaking of the "VARI-CON" is just as simple and easy as making the original setting. No tools are needed for either operation.

Model VC-1

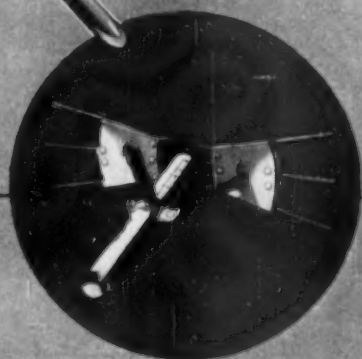


Model VC-2



Model VC-4

Stack them for added gain.



Calibrated sleeve for quick  
peaking of antenna.

## THE HEART OF THE "VARI-CON"

Above is a view of the new mechanism which enables anyone to adjust the peaking of the FALCON "VARI-CON" to any range of channels desired. The sliding sleeve, on the calibrated boom, automatically fine out the elements to their correct position.

A simple, trouble-proof, snap-action spring in the

butterfly keeps the elements solidly in place. The insulated hinge assembly is extremely strong, durable and weather-resistant and has an extra long leakage path. Weight has been kept to a minimum, strength at a maximum in order to assure long life and freedom from wind and weather damage. A heavily plated mast clamp is supplied.

# the "VARI-CON"

(The conical that's variable)

## Provides all Channel Performance...

### Yet can be Peaked for Increased Gain on any Channel Range

The FALCON "VARI-CON" was designed for today, tomorrow and years to come. Its unusual construction permits setting the "VARI-CON" for all-channel performance peaked to provide the additional gain needed on special channels. In addition, the variable patterns obtainable are of great value in ghost elimination.

There is no guess work; no tedious assembly; no field strength equipment needed to peak the "VARI-CON" for high-gain, sharp pattern performance in your area. It's as simple and easy as opening an umbrella. Here's all you do: Unpack the "VARI-CON"—Slide the adjusting sleeve to the calibrated marking on the boom for the best reception of channels in your area—Fan out the reflector elements—Tighten the locking wing nuts. The "VARI-CON" is

automatically peaked WHERE YOU WANT IT and ready to install. It is the only conical that enables you to provide a custom-made installation resulting in higher gain and increased customer satisfaction.

The NEW FALCON "VARI-CON" is ruggedly constructed. Heavy-duty heads will not crack or break. The steel spring snap-action butterfly assemblies are unbreakable. Full length, 48 inch, elements are used. One of the most capable engineering staffs in the industry has worked out every last detail of this truly remarkable TV antenna. To the high gain all-channel performance and excellent line match of the conical, FALCON engineers have added the "plus" feature — adjustable, calibrated channel range peaking!

#### FALCON

The new "VARI-CON" is one of the most significant additions to antenna design. Watch for the other new FALCON antennas which will be announced in the near future! Each will represent the most advanced, most efficient antenna design of its type.

WRITE FOR ILLUSTRATED FOLDER AND PRICES



FALCON ELECTRONICS COMPANY • 2003 CEDAR ST. • QUINCY, ILLINOIS

NATIONAL ADVERTISING TO SHOW  
NEW FALCON "VARI-CON"

To simulate sales on all levels FALCON  
is conducting one of the most successful  
advertising campaigns in the industry. Full  
two-page color spreads are appearing regu-  
larly in many of the nation's top trade and  
consumer publications.



# GUARANTEED PERFORMANCE

**MONEY BACK GUARANTEED TO RECEIVE *All* UHF and *All* VHF STATIONS IN *All* DIRECTIONS FOR 60 MILES WITHOUT A ROTORMOTOR OF ANY KIND!!**

**SO NEW! SO DIFFERENT!  
IT'S PATENTED!**

#2,585,670

#2,609,503

#2,625,655

#2,644,091

OTHERS PENDING

## WORLD'S MOST POWERFUL UHF—VHF TELEVISION ANTENNA

While antenna reception is guaranteed for 60 miles, perfect pictures have been consistently received as far as 160 miles from stations.

**NEW**

### POLYMICALENE 4 CONDUCTOR TRANSMISSION LINE

- Low Loss External - Air Dielectric
- Matched Impedance
- Eliminates End Sealing
- Eliminates Condensation
- Up to 50% Less Loss Than Tubular When Wet
- Easily Spiraled
- No Breaking or Shorting
- Patents Pending - T. M. Reg.



## *All* NEW DESIGN FOR '54

- LOW-LOSS SWITCH
- LOW-LOSS PHENOLIC INSULATORS
- USES NEW 4-CONDUCTOR MATCHED IMPEDANCE LINE
- ONLY 10 INCH SPACING BETWEEN ANTENNA BAYS

**Money Back Guarantee**  
**IN ALL LOCATIONS**  
**WITH STATIONS IN ALL-DIRECTIONS**

The new All Channel Model Super 60 is guaranteed to bring in, immediately on installation, every UHF and every VHF station within 60 miles in any direction, giving clearer and sharper pictures than any antenna or combination of antennas with or without rotor motors. If, immediately on installation, it fails to do this, we agree to refund to the jobber to whom we sold and shipped it, his full purchase price.

LIST PRICE

**\$36<sup>75</sup>**

SEE YOUR LOCAL  
JOBBER

The 9 position selector switch electronically rotates the antenna in a stationary position.



#### PRICE INCLUDES

Complete stacked array • 4 stacking bars • 9 position switch • Switch-to-set coupler • 2 - 7 1/2" stand offs • Individually boxed in mailable carton

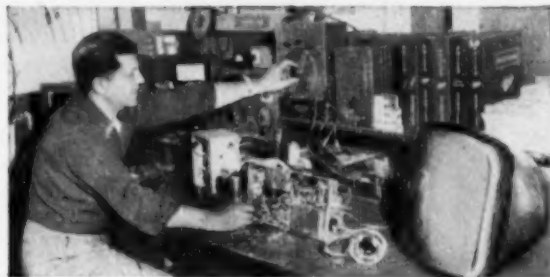
**ALL CHANNEL ANTENNA CORP.**

70-07 Queens Blvd., Woodside 77, N. Y.

Hickory 6-2304

# Here comes opportunity

## ...ready or not!



- Prepare now for the new Radio-TV-Electronics boom. Get in on VHF and UHF . . . aviation and mobile radio . . . color TV . . . binaural sound! The International Correspondence Schools can help you!

If you've ever thought about Radio or Television as a career . . . if you have the interest, but not the training . . . if you're waiting for a good time to start . . . NOW'S THE TIME!

No matter what your previous background, I.C.S. can help you. If Radio-TV servicing is your hobby, I.C.S. can make it your own profitable business. If you're interested in the new developments in Electronics, I.C.S. can give you the basic courses of training you need. If you have the job but want faster progress, I.C.S. can qualify you for promotions and pay raises.

I.C.S. training is success-proved training. Hundreds of I.C.S. graduates hold top jobs with top firms like R.C.A., G.E., DUMONT, I.T.&T. Hundreds of others have high ratings in military and civil service. Still others have successful businesses of their own.

With I.C.S., you get the rock-bottom basics and theory as well as the all-important bench practice and experimentation. You learn in your spare time—no interference with business or social life. You set your own pace—progress as rapidly as you wish.

**Free career guidance:** Send today for the two free success books, the 36-page "How to Succeed" and the informative catalog on the course you check below. No obligation. Just mark and mail the coupon. With so much at stake, you owe it to yourself to act—and act fast!

### CHECK THESE SEVEN FAMOUS I. C. S. COURSES —ONE FOR YOU!

- ☐ **PRACTICAL RADIO-TELEVISION ENGINEERING**—Foundation course for radio-television career. Basic principles plus advanced training. Radio, Sound, TV.
- ☐ **TELEVISION TECHNICIAN**—To qualify you for high-level technical positions in television. Camera, studio, transmitter techniques. Manufacture, sale and installation of TV equipment.
- ☐ **TELEVISION RECEIVER SERVICING**—Installation, servicing, conversion. Dealership. For the man who knows about radio and wants TV training.
- ☐ **RADIO & TELEVISION SERVICING**—Designed to start you repairing, installing and servicing radio and television receivers soon after starting the course.
- ☐ **RADIO & TELEVISION SERVICING WITH TRAINING EQUIPMENT**—Same as above but with addition of high-grade radio servicing equipment and tools.
- ☐ **RADIO OPERATING COURSE**—Special course to help you pass the Government examination for operator's licenses. Code, TV, FM, Radio regulations.
- ☐ **INDUSTRIAL ELECTRONICS**—Broad, solid background course devoted to the electron tube and to its many applications.

I. C. S.—the lifetime Christmas gift

I. C. S., Scranton 9, Penna.

## INTERNATIONAL CORRESPONDENCE SCHOOLS

ICS

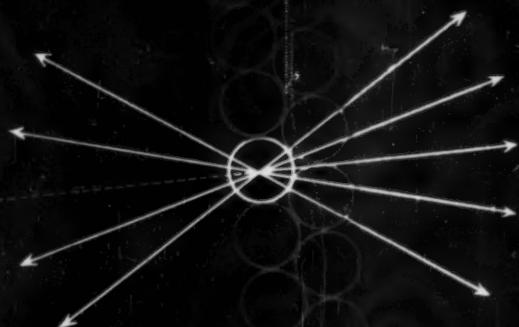
BOX 2249-D, SCRANTON 9, PENNA.

Without cost or obligation, send me "HOW TO SUCCEED" and the booklet about the course BEFORE which I have marked X:

- |   |  |   |   |
|---|--|---|---|
| <b>ART</b><br><input type="checkbox"/> Commercial Art<br><input type="checkbox"/> Magazine Illustrating<br><input type="checkbox"/> Fashion Illustrating<br><input type="checkbox"/> Cartooning<br><input type="checkbox"/> Sketching and Painting<br><input type="checkbox"/> Show Card and Sign Lettering<br><b>AUTOMOTIVE</b><br><input type="checkbox"/> Automobile Mechanic<br><input type="checkbox"/> Auto Elec. Technician<br><input type="checkbox"/> Auto Body Rebuilding and Refinishing<br><input type="checkbox"/> Diesel—Gas Engines<br><b>AVIATION</b><br><input type="checkbox"/> Aeronautical Engineering Jr.<br><input type="checkbox"/> Aircraft Engine Mechanic<br><input type="checkbox"/> Airplane Drafting<br><b>BUILDING</b><br><input type="checkbox"/> Architecture<br><input type="checkbox"/> Arch. Drafting<br><input type="checkbox"/> Building Contractor<br><input type="checkbox"/> Estimating<br><input type="checkbox"/> Carpenter and Mill Work<br><input type="checkbox"/> Carpenter Foreman<br><input type="checkbox"/> Reading Blueprints<br><input type="checkbox"/> House Planning<br><input type="checkbox"/> Plumbing<br><input type="checkbox"/> Heating<br><input type="checkbox"/> Painting Contractor<br><input type="checkbox"/> Air Conditioning<br><input type="checkbox"/> Electrician<br><b>BUSINESS</b><br><input type="checkbox"/> Business Administration<br><input type="checkbox"/> Certified Public Accountant<br><input type="checkbox"/> Bookkeeping and Accounting<br><input type="checkbox"/> Office Management<br><input type="checkbox"/> Stenography and Typing<br><input type="checkbox"/> Secretarial<br><input type="checkbox"/> Federal Tax<br><input type="checkbox"/> Business Correspondence<br><input type="checkbox"/> Letter-writing Improvement<br><input type="checkbox"/> Personnel and Labor Relations<br><input type="checkbox"/> Advertising<br><input type="checkbox"/> Retail Business Management<br><input type="checkbox"/> Managing Small Business<br><input type="checkbox"/> Ocean Navigation<br><input type="checkbox"/> Sales Management<br><input type="checkbox"/> Short Story Writing<br><input type="checkbox"/> Creative Salesmanship<br><input type="checkbox"/> Traffic Management<br><b>CHEMISTRY</b><br><input type="checkbox"/> Chemical Engineering<br><input type="checkbox"/> Chemistry<br><input type="checkbox"/> Analytical Chemistry | <input type="checkbox"/> Petroleum—Nat'l Gas<br><input type="checkbox"/> Polp and Paper Making<br><input type="checkbox"/> Plastics<br><b>CIVIL STRUCTURAL ENGINEERING</b><br><input type="checkbox"/> Civil Engineering<br><input type="checkbox"/> Structural Engineering<br><input type="checkbox"/> Surveying and Mapping<br><input type="checkbox"/> Structural Drafting<br><input type="checkbox"/> Highway Engineering<br><input type="checkbox"/> Reading Blueprints<br><input type="checkbox"/> Construction Engineering<br><input type="checkbox"/> Ship Drafting<br><input type="checkbox"/> Sanitary Engineering<br><b>DRAFTING</b><br><input type="checkbox"/> Aircraft Drafting<br><input type="checkbox"/> Architectural Drafting<br><input type="checkbox"/> Electrical Drafting<br><input type="checkbox"/> Mechanical Drafting<br><input type="checkbox"/> Structural Drafting<br><input type="checkbox"/> Sheet Metal Drafting<br><input type="checkbox"/> Ship Drafting<br><input type="checkbox"/> Mine Surveying and Drafting<br><b>ELECTRICAL</b><br><input type="checkbox"/> Electrical Engineering<br><input type="checkbox"/> Electrician<br><input type="checkbox"/> Electrical Maintenance | <input type="checkbox"/> Electrical Drafting<br><input type="checkbox"/> Electric Power and Light<br><input type="checkbox"/> Lineman<br><b>HIGH SCHOOL</b><br><input type="checkbox"/> High School Subjects<br><input type="checkbox"/> Mathematics<br><input type="checkbox"/> Commercial<br><input type="checkbox"/> Good English<br><b>MECHANICAL AND SHOP</b><br><input type="checkbox"/> Mechanical Engineering<br><input type="checkbox"/> Industrial Engineering<br><input type="checkbox"/> Industrial Drafting<br><input type="checkbox"/> Industrial Supervision<br><input type="checkbox"/> Foremanship<br><input type="checkbox"/> Mechanical Drafting<br><input type="checkbox"/> Machine Shop Practice<br><input type="checkbox"/> Machine Design-Drafting<br><input type="checkbox"/> Tool Design<br><input type="checkbox"/> Industrial Instrumentation<br><input type="checkbox"/> Machine Shop Inspection<br><input type="checkbox"/> Reading Blueprints<br><input type="checkbox"/> Toolmaking<br><input type="checkbox"/> Gas—Electric Welding<br><input type="checkbox"/> Heat Treatment—Metallurgy<br><input type="checkbox"/> Sheet Metal Work<br><input type="checkbox"/> Sheet Metal Pattern Drafting<br><input type="checkbox"/> Refrigeration | <b>POWER</b><br><input type="checkbox"/> Combustion Engineering<br><input type="checkbox"/> Diesel—Electric<br><input type="checkbox"/> Electric Light and Power<br><input type="checkbox"/> Stationary Steam Engineering<br><input type="checkbox"/> Stationary Foreman<br><b>RADIO, TELEVISION COMMUNICATIONS</b><br><input type="checkbox"/> Practical Radio—TV Eng'ing<br><input type="checkbox"/> Radio Operating<br><input type="checkbox"/> Radio and TV Servicing<br><input type="checkbox"/> Television—Technician<br><input type="checkbox"/> Electronics<br><input type="checkbox"/> Telephone Work<br><b>RAILROAD</b><br><input type="checkbox"/> Locomotive Engineer<br><input type="checkbox"/> Diesel Locomotive<br><input type="checkbox"/> Air Brakes<br><input type="checkbox"/> Car Inspector<br><input type="checkbox"/> Railroad Administration<br><b>TEXTILE</b><br><input type="checkbox"/> Textile Engineering<br><input type="checkbox"/> Cotton, Rayon, Woolen Mfg.<br><input type="checkbox"/> Carding and Spinning<br><input type="checkbox"/> Weaving and Weaving<br><input type="checkbox"/> Loom Fixing<br><input type="checkbox"/> Throwing<br><input type="checkbox"/> Finishing and Dyeing<br><input type="checkbox"/> Textile Compacting |
|---|--|---|---|

Name \_\_\_\_\_ Age \_\_\_\_\_ Home Address \_\_\_\_\_  
 City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to P.M.  
 Occupation \_\_\_\_\_

Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada. . . . Special tuition rates to members of the U. S. Armed Forces.



## what Aluminizing means

Aluminizing means the efficient use of light—light is energy—energy is the pay-off.

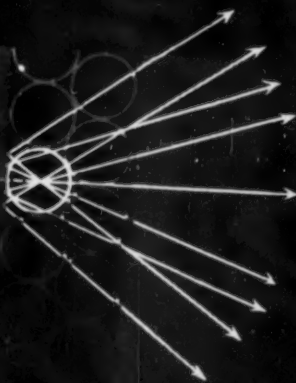
Aluminizing means a brighter TV picture, greater contrast, lower beam current, smaller spot size, sharper focus, reduced screen scorch—all from the efficient use of light.

On the inside of any TV tube face is a coating of phosphor crystals—the picture screen. As the electron beam—tracing the picture—strikes these crystals, they glow, giving off light in all directions. And there's the problem! Half the light thus generated is *inside* the tube, either lost to usefulness or lighting areas that should be dark. Both brightness and contrast suffer.

But—put a mirror behind the phosphor and "wandering" light is reflected back through the tube face. *Aluminizing creates this desired mirror!*

To aluminize a picture tube, deposit a nitrocellulose film evenly over the phosphor. Over that, deposit a film of aluminum only millionths of an inch thick—just thick enough to reflect the light and just thin enough to let the electrons pass through. Under heat, evaporate the nitrocellulose film to leave a thin smooth coating of aluminum. Result—an efficient light reflecting mirror to specifications.

Simple as it sounds, Rauland research engineers worked for three years to solve the problem and were among the first to do so.



# Rauland

Perfection through Research

ZENITH Subsidiary

**BUY DIRECT  
AND SAVE**

# Sweeping the Country!

**'PRE-FAB'**

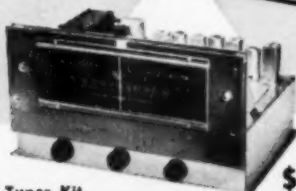
# COLLINS

## TUNERS and RECEIVERS

**AUDIO PRODUCTS CO.**

Collins Audio Products Co. is in no way affiliated with Collins Radio Co.

Two ALL NEW Complete Kits for  
Every High-Fidelity Need



**FM Tuner Kit**

**\$55**

The FM-11 tuner is available in kit form with the IF Amplifier mounted in the chassis, wired and tested by us. You mount the completed RF Tuning Unit and power supply, then after some simple wiring, it's all set to operate. 11 tubes: 6J6 RF amp, 6AG5 converter, 6C4 oscillator, 6BA6 1st IF, (2) 6AU6 2nd and 3rd IF, (2) 6AU6 limiters, 6AL5 discriminator, 6AL7-GT double tuning eye, 5Y3-GT rectifier. Sensitivity 6 to 10 microvolts, less than 1/2 of 1% distortion, 20 to 20,000 cycle response with ZDB variation. Chassis dimensions: 12 1/2" wide, 8" deep, 7" high. Illustrated manual supplied. Shipping weight 14 lbs.

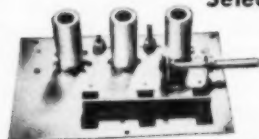


**FM/AM Tuner Kit**

**\$77<sup>50</sup>**

The original 15 tube deluxe FM-AM pre-fab kit redesigned on a smaller chassis. The tuner now measures 14" wide by 12" deep by 7 1/2" high. This attractive new front and dial assembly opens up new applications where space is at a premium. Kit includes everything necessary to put it into operation—punched chassis, tubes, wired and aligned components, power supply, hardware, etc. Kit comprises FMF-3 tuning unit, IF-6 amplifier, AM-4 AM tuning unit, magic eye assembly and complete instructions. All tubes included. Shipping weight 19 lbs.

### Selected Basic Components For Special Applications



**FMF-3 Tuning Unit**

**\$15<sup>25</sup>**

The best for FM. The most sensitive and most selective type of "front end" on the market. 6 to 10 microvolts sensitivity. Image ratio 500 to 1. 6J6 tuned RF stage, 6AG5 converter, 6C4 oscillator. Permeability tuned, stable and drift-free. Chassis plate measures 6 1/2" x 4 1/2". In combination with the IF-6 amplifier, the highest order of sensitivity on FM can be obtained. Tubes included as well as schematic and instructions. Draws 30 ma. Shipping weight FMF-3: 2 1/2 lbs. Dial available @ \$3.85



**IF-6 Amplifier**

**\$19<sup>75</sup>**

A remarkable value! 6 tubes are used in the IF amplifier: 6BA6 1st IF, (2) 6AU6 2nd and 3rd IF's, (2) 6AU6 limiters and 6AL5 discriminator. High gain, wide-band response (200 KC) for highest fidelity. 20 to 20,000 cycles. Distortion less than 1/2 of 1%. Draws 40 ma @ 220 volts. Chassis plate dimensions: 11-5/16" x 2 1/2" Shipping weight: 3 lbs.



**AM-4 Tuning Unit**

**\$24<sup>50</sup>**

Tops in AM superhet performance! A 3-gang tuning condenser gives 3 tuned stages with high sensitivity and selectivity. Assembly is completely wired, tested and aligned ready for immediate use. Frequency coverage 540 KC to 1650 KC at a sensitivity of 5 microvolts. Tubes 6BA6 RF amplifier; 6BE6 converter; 6BA6 IF amplifier and 6AT6 detector. Draws 30 ma @ 220 volts. Mounts on a chassis plate measuring 4" x 7 3/8". Shipping weight 2 1/2 lbs. Dial available at \$3.85.



**RD-1C Tuner & Dial**

**\$28<sup>50</sup>**

The COLLINS RD-1C FM tuner chassis is unique in the field. A whole, compact FM tuner and dial that fits in the palm of your hand. Convert AM sets to FM/AM receivers for only a few dollars! Unlimited applications where space is at a premium. Use in conjunction with your phonograph amplifier. Full frequency response to 20,000 cycles. Sensitivity 20 microvolts, permeability tuned. Tuning unit and IF amplifier on the same chassis plate. Draws 40 ma @ 100 volts. Tubes: 6AG5 converter, 6C4 oscillator, (2) 6AU6 IF amplifiers, 6AL5 in new ratio detector circuit. Shipping weight tuner and dial 5 lbs.

**MAIL  
COUPON  
TODAY**

To: Collins Audio Products Co., Inc.  
P.O. Box 368, Westfield, N. J.  
Tel. Westfield 2-4390

☐ FM Tuner Kit ☐ FM/AM Tuner Kit ☐ Slide Rule Dial Assembly  
☐ FMF-3 Tuning Unit ☐ IF-6 Amplifier ☐ RD-1C Tuner and Dial  
☐ AM-4 Tuning Unit

NAME

ADDRESS

CITY  STATE

Amount for Kit \$  See weights, add shipping cost \$

Total amount enclosed \$  Check ☐ Money Order ☐

**WHEN YOU THINK OF TUNERS, THINK OF COLLINS AUDIO PRODUCTS**

# THE Original WRENCH WITH THE SCREWDRIVER ACTION!



## SPINTITE

REG. U. S. PAT. OFFICE

120 STYLES and SIZES

for

- ASSEMBLY WORK
- REPAIR WORK
- RADIO
- TELEVISION
- INDUSTRIAL
- AIRCRAFT



STEVENS WALDEN, Inc.  
WORCESTER 4, MASS.

## Spot Radio News

\* Presenting latest information on the Radio Industry.

By RADIO & TELEVISION NEWS'  
WASHINGTON EDITOR

INDUSTRY'S BRASH and volatile infant, color TV, which made its first full-dress appearance before the seven guardians of the airlines, during the early weeks of the fall, proved to be a polished performer. While many of the Commission had attended preview demonstrations of the reds, greens, and blues, this was the first official show not only before the entire FCC body and members of various departments, but representatives of foreign countries and scores in industry, too.

The historic test was planned at a meeting in Washington, during which all of the nation's leading color and broadcasting specialists appeared. Among those in attendance were Curtis B. Plummer, chief of the FCC's broadcast bureau; David Smith, NTSC vice-chairman; C. B. Jolliffe, RCA's vice-prexy; Robert M. Estes and R. M. Johnson, G-E; Richard Salant, William Lodge, and Leon Brooks of CBS; R. N. Harmon, Westinghouse; former FCC headman Paul Porter, now representing Paramount; Richard Hodgson, Chromatic Television; James R. McRae, IRE prexy, representing Bell Labs; Henry Weaver, Philco; and Grant Woodside, Motorola.

The demonstrations involved subject matter containing a wide range of hue and chroma, including strongly contrasting color patterns for indoor motion featuring normal and rapid movements in closeups and medium length shots, plus outdoor views, slides and color test patterns with selected closeups, and distant shots. Also on the program were transmissions over the present 2.7-mc. coax cable and relays, and simultaneous comparisons of subject matter before studio and field cameras and on the picture-tube screens. Variations in lighting levels at the studios and ambient lighting levels at the receiver were also on the agenda for review.

Color sets from about a dozen set makers were lined up, and these were supplemented by black and white sets for compatibility study. Three nets in New York were selected to put on the special show; NBC, CBS, and Du Mont. The first part of the program featured a studio color program, followed by a closed-circuit intercity transmission from New York to Washington and return, over a coax cable and microwave link. (This test was similar to that held for NTSC

broadcast groups in the lounge of the Center Theatre in New York City, before the official petition was submitted to the Commission.) Remotes from outdoors were next on the program, followed by test patterns and slides.

Although the Commissioners were acquainted with the compatible technique, they pointed out that they wanted to be completely familiar with the system, and would be extremely cautious before approval was granted. Declared Commander Ed Webster, during a recent meeting, on this point: "While we have been apprised from time to time of the progress being made by the NTSC, certainly no fair-minded, serious-thinking person would insist that the Commission could, in a few days, thumb through more than a thousand pages of NTSC reports contained in sixteen volumes, and arrive at an approximate decision based on such a cursory examination. I cannot permit myself to be forced into a premature conclusion by those whose special interests would place them in a position of benefiting by an early decision."

Supporting earlier comments of the Commission's headman, Rosel Hyde, Commissioner Webster added: "I cannot impress . . . too strongly the fact that once this decision is made and color television becomes an actuality, in all likelihood there will be no turning back. Once color television receivers are in general use by the public, it will be impracticable to change the standards, should we subsequently find that an error has been committed." He then warned that he would examine the proposal in an extremely critical manner, to be absolutely sure that his trust to the public is carried out. "This does not mean," he noted, "that I am going to be dilatory . . . Our ultimate goal is a correct decision based on a thorough analysis of the reports and tests, rather than a quick decision, superficially made."

Feeling certain that the compatible setup would be approved, industry began making and announcing plans for production. During the recent electronics convention in Chicago, the company in which the NTSC chairman serves as vice-prexy exhibited a tri-color tube, different from the models demonstrated by others. This

RADIO & TELEVISION NEWS



## *"Kwik-Test"* CAPACITOR CHECKER

TEST FOR	EYE INDICATION	CAPACITOR CONDITION
SHORT	REMAINS OPEN	SHORTED
	CLOSES	NOT SHORTED
	FLUTTERS	INTERMITTENT
OPEN	REMAINS OPEN	OPEN
	CLOSES	NOT OPEN
	FLUTTERS	INTERMITTENT

CAPACITORS MAY BE CHECKED FOR OPEN, SHORTED OR INTERMITTENT CONDITION WHILE IN THE CIRCUIT BUT CIRCUIT UNDER TEST MUST BE TURNED OFF

### **A NEW RIGHT ARM for the service technician**

**TURNS TROUBLE-SHOOTING HOURS INTO SECONDS!  
CHECKS CAPACITORS FOR OPENS, SHORTS, OR  
INTERMITTENTS, RIGHT IN THE CIRCUIT.**

Here's the most useful instrument to hit the service bench since the vacuum tube voltmeter—Sprague's new "Kwik-Test" Capacitor Checker.

No longer do you have to sweat through the time-consuming nuisance of unsoldering capacitors from a circuit just to check them.

Now by the mere flick of two switches, Kwik-Test tells you whether any bypass, coupling, or filter capacitor within the range of 30 mmf to 2000 mf is open, shorted, or intermittent... even when it is in parallel with a resistance as low as 60 ohms. Capacitors between .1 and 2000 mf may be tested for shorts and intermittent

shorts even if in parallel with a resistor as low as 2 ohms.

Yes, Kwik-Test is a basic instrument you can't afford to be without. You'll realize that more and more as capacitors in old TV sets begin to go... and as the number of capacitors in each set increase with the introduction of new and more complicated receivers.

Get a 10 second demonstration of the amazing Kwik-Test capacitor checker at your Sprague distributor. Don't delay! Once you try it, you'll be sure to buy it! Or write for descriptive data circular M-600 to Sprague Products Co., 51 Marshall Street, North Adams, Mass.

only **\$34.50** net

PAYS FOR ITSELF IN NO-TIME

DON'T BE VAGUE...ASK FOR

# SPRAGUE

WORLD'S LARGEST CAPACITOR MANUFACTURER



THE FISHER HI-LO FILTER SYSTEM • MODEL 50-F

# New!

PROFESSIONAL  
AUDIO  
EQUIPMENT AT  
LOW  
COST!

## FISHER Hi-Lo Filter System

■ Here it is at last—America's first electronic sharp cut-off Filter System. Suppresses turn-table rumble, record scratch and distortion, etc., with the absolute minimum loss of frequency response. Separate low and high frequency cut-offs. Can be used with any tuner, preamplifier, amplifier, etc. No insertion loss. Uniform response 20-20,000 cycles,  $\pm 0.5$  db. Self-powered. All-triode. Beautiful plastic cabinet. **Only \$29.95**

## FISHER Preamplifier-Equalizer

■ Now, professional record equalization facilities are within the reach of every record collector. THE FISHER Model 50-PR, like its big brother (Model 50-C) is beautifully designed and built. **Only \$19.95**

THE FISHER PREAMPLIFIER-EQUALIZER • MODEL 50-PR



### OUTSTANDING FEATURES

- Independent switches for low-frequency turnover and high frequency roll-off. • 16 combinations. • Handles any low level magnetic pickup. • Hum level 60 db below 10 mv input. • Uniform response 20-20,000 cycles,  $\pm 1$  db. • Two triode stages. • Full low frequency equalization. • Output lead any length up to 50 feet. • Beautiful plastic cabinet, etched brass control panel. • Completely shielded chassis. • Built-in AC switch. Jewel indicator light.

Write for full details

**FISHER RADIO CORP.**

39 EAST 47th STREET • N. Y.

model, it was said, would sell for about \$175 to set makers and should be available in early '54.

In the east, a chassis maker introduced, during a meeting in New York, a color set that was ready for the production line and would be priced at \$700. The receiver, a console model, used a 16-inch tube, and provided a 14-inch picture. Its size was 36 inches wide, 28 inches deep, and 37 1/4 inches high. The prexy of this company declared that, within eighteen months after the FCC says go, color receivers will carry a retail price about 25 per cent above that of monochrome models. He felt that color chassis will not replace black and whites for many years, but that there will be a steadily decreasing market for higher priced black and white sets as the production of color models increases and their prices are brought closer in line with black and white models.

It was generally believed that as soon as the Commission reports favorably on the compatible petition, at least a dozen manufacturers will announce their color plans and possibly even bring pilot models to key centers for special demonstrations. Several are mapping holiday shows, if color is official by the Yuletide.

WHILE COLOR was on stage, the ultra-highs were in the wings ready for an appearance, too; a private one for the Commission. Seems as if the FCC decided that it should have a u.h.f. progress report from broadcasters and manufacturers, and sent out letters to the networks, industry associations, and individual stations asking for a detailed review of their operations, past, present, and future.

Declaring that the Commission was interested in the progress made by the new post-freeze stations, broadcasters were asked to submit figures . . . "showing . . . total television broadcast revenues, and total broadcast revenues for each month since . . . they went on the air." Networks were asked to reveal all of their affiliates, programs carried on a commercial and sustaining basis, and financial arrangements in force between key and affiliated stations.

In a letter to RETMA, the FCC asked for information on transmitting and receiving equipment made by member companies. They were interested, the Commission declared, in learning how many sets were made for low- and high-band coverage, types being produced, and tuners and converters being made. All information, it was said, would be kept confidential.

PAY-AS-YOU-SEE TV, which has become quite a peppery subject in Washington and among broadcasters, found itself bathed in glowing tribute during a meeting in Philadelphia recently, when twenty-seven TV station owners and permit holders convened to discuss the virtues of home-pay TV.

(Continued on page 166)



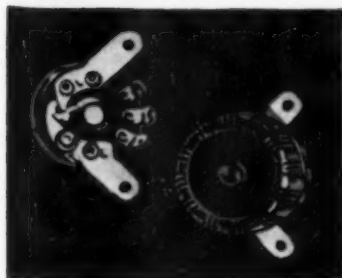
## QUICK FACTS ON **Centralab**

# BIG 5

... electronic components  
that make a big difference  
in doing fast  
guaranteed servicing

**1**

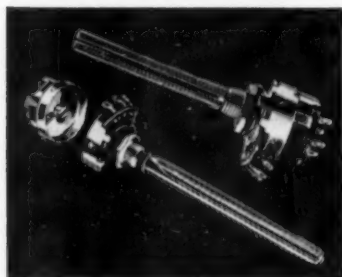
### VOLUME CONTROLS —most complete line for safest guaranteed service replacement



#### Model 1 Radiohm®—world's smallest resistor with the longest list of uses

Widely used as standard for hearing aids plus many other commercial and military miniature applications. Its  $\frac{5}{8}$ " diameter makes it no larger than

a dime. Shielded from dust, lint, etc. Rated at  $\frac{1}{10}$  watt. Available in 5 resistance ranges with standard tapers. Plain or switch types.



#### Model B — Blue Shaft(†), plain or switch types

Velvet smooth, low noise level operation. Precision controls that are only  $\frac{1}{16}$ " in diameter, yet rated at  $\frac{1}{2}$  watt. Phenolic base resists humidity. Ratings from 500  $\Omega$  to 10 megohms. 13 stand-

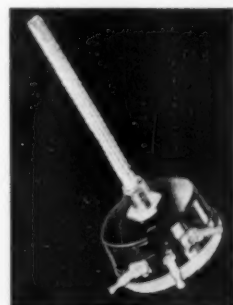
ard tapers. Universal fluted mill shaft — or split knurl for push-on knobs. Type KB attachable switch available in 3 types, will convert plain control to switch type in seconds.



#### Twin and dual concentric specials

16 standard twins and a complete line of custom dual controls. Twins consist of two tandem mounted Model B Controls (Blue Shaft) operated by a single shaft. Front resistance 10,000 ohms to 5 meg. Rear resistance 25,000 to 5 meg. Universal, fluted mill, full length shafts. Duals are factory as-

sembled custom units made exactly to original set manufacturer's specifications, complete and ready to install. Only factory assembled, factory tested complete units can be absolutely guaranteed for performance by any control manufacturer. That's why Centralab's are guaranteed safest for servicing.



#### 3- and 4-watt Radiohms wire-wound, composition

These smooth action wire-wound Radiohms are available in 3- and 4-watt models. Three shaft types — universal mill, split-knurl and finger-tip knurl screwdriver slotted.

##### Model V (plain) — 3-watt

28 resistance values — 2 to 10,000 ohms max. Switches available for use with Model V.

##### Model SVT (center tapped) — 3-watt

Resistance range 20 to 50 ohms.

##### Model SVP — 4-watt

16 resistance values — 25 to 20,000 ohms max. 3 shafts available.



#### Compentrol(†)

##### Infinitely variable loudness control

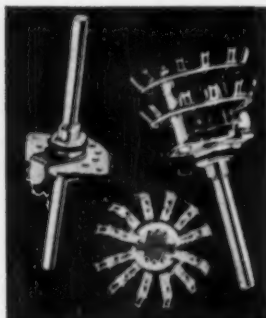
Combination volume control and Printed Electronic Circuit. Designed to better reproduce the apparent base and treble response of amplifiers, phono combinations, radio and TV sets when volume is at low level. Needs no additional amplification. Assures hi-fi reproduction without inducing a signal loss. Available in  $\frac{1}{2}$  and 1 meg plain and switch types. Senior Compentrol — (the dual shaft unit with controllable compensation) is now available.

†Trademark

## CENTRALAB'S BIG 5 MAKES A BIG DIFFERENCE IN

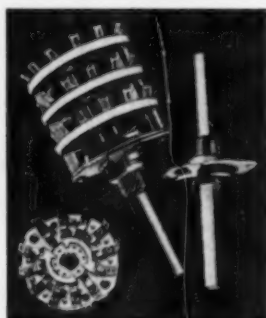
### 2 SWITCHES—a lot more switch in a lot smaller package

#### STANDARD AND MINIATURE SWITCHES



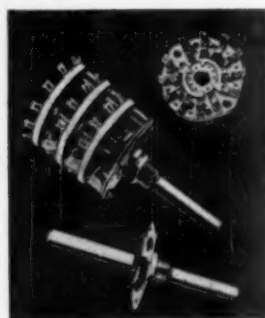
**Series 1400 Rotary Selector Switches with Phenolic Insulation**

Extremely compact. Sections, indexes and hardware available separately for special switching combinations. Index positive 30° with adjustable stop. Shorting and non-shorting contacts.



**Series 2500 Rotary Selector Switches with Steatite Insulation**

For fast, positive band switching in critical r.f. applications. Ideal for TV, radio, transmitters, fine test equipment and laboratory instruments. Switch rated at 10 watts. Available also, separate sections and hardware. Shorting and non-shorting types.



**Ceramic Miniature Switches for low-loss, high-frequency applications**

**Type PA-2000**—New small size! Adjustable stop for selection of positions or continuous rotation. Meets 50-hour salt spray tests. Same ratings as the larger 2500 series. Up to 1 pole—12 positions per single section. (Type PA-1000 phenolic Miniature Switches available).



**PK-300 Speaker Switch Kit**

Kit contains *complete* assembly for switching between dual speakers (such as auto rear and front seat speakers). Includes etched dial-mounting plate, switch and self-tapping screws. No hole to drill in face of dashboard. Three way selection, front, rear, or both, speakers.



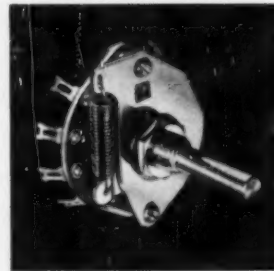
**PCH-4 Attenuator**

Designed with Centralab's exclusive Printed Circuit TV H-Pads. A must — for balancing the signal strength to requirements of set due to daily conditions, or from one or more TV stations located unusually close to the receiver. Extremely accurate in eliminating overloading and tearing image — also interference, by reducing the interfering signal in a single channel. H-Pads also help match impedance between set and antenna.



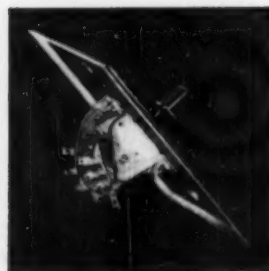
**Tone Switches**

Widely used in radio-phonograph and allied sound equipment. Available in SPST, SPDT, DPST and DPDT SP-3 and 4 position models. All rated at 1 amp. — 6 volts D.C. Shorting and non-shorting contacts. Positive index. Contact resistance less than 2½ milliohms. Can be supplied with a-c line switch.



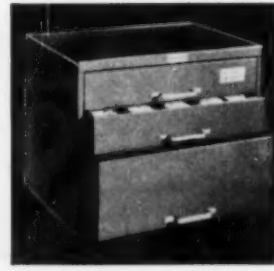
**Spring Return Switches**

**Type 1448-49** — "Universal type" PA and intercom switch with listen position. Available with spring return one or both sides to center, non-shorting, 30° index. Index spring is tested for a minimum life of 150,000 cycles. Will replace any unit from 2 pole, 2 position to 6 pole, 3 position.



**Lever Switches**

For smoother action, positive indexing on speech input equipment, etc. Tested for minimum 150,000 switching cycles. 8 basic indexing combinations. Available in positive, spring return, or combination. Shorting and non-shorting types, 2 to 4 poles, 2 and 3 positions. Mounting plates optional.



**Complete Switch Kits**

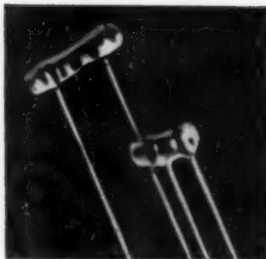
Afford a convenient, readily available source of stock sections, indexes and hardware for assembling any standard or practically any special rotary switching arrangement. 4 standard switch kits: Kit No. 414 for phenolic; Kit No. 419 for steatite; Kit No. 1500, rotary selector standard phenolic; Kit No. 2000, miniature steatite.

All parts included are standard stock items and may be ordered separately from your CRL distributor.

**RADIO & TELEVISION NEWS**

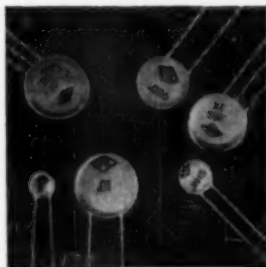
## ELECTRONIC DESIGN, MANUFACTURE AND SERVICE

### 3 CAPACITORS—closer tolerances, more values to choose from



**BC Tubular**

Ideal for use in by-pass, audio coupling applications and general circuit use. Available from 1 mmf to 10,000 mmf. Centralab's own Ceramic-X body withstands temperatures to 2200° F...makes capacitor impervious to moisture and low power factor. Keep plenty on hand.



**BC Discs**

Ultra-compact — designed specifically to solve high-capacity, low-inductance, and small space requirements. 4 sizes:  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{3}{4}$ ". Available in single, non-shielded dual and shielded dual types.  $\pm 20\%$  and CMV.



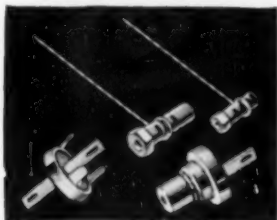
**TC Tubular**

Temperature compensating tubulars, type TCZ show no capacitance change over wide range of temperatures. Type TCN have special ceramic body to vary capacitance negatively to temperature changes. Comply to preferred values as set up by RTMA and JAN-C-20A.



**HI-VO-KAPS®**

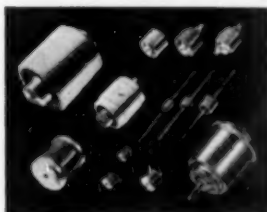
Fastest — for servicing, safest high-voltage capacitor available. Centralab's TV Hi-Vo Kaps are the standard for the TV industry, including UHF. Capacitance 500 mmf; 10 KV, 20 KV and 30 KV d-c. Will withstand continuous overload up to twice rated working voltage. Small diameter 1" to 1.4" maximum. 7 terminal combinations. (Also available in attachable terminal style).



**Stand-Off and Button-Style**

Type S1 Tubular Stand-Off (50 to 2500 mmf) by-passes r.f. to ground in many HF, UHF and VHF circuits. Type S2 (5,000 to 10,000mmf). One end threaded for panel mounting.

**Button-style "Zippers" (†)** — a long-life replacement for old-style mica "Buttons." Available in 5 different types. Used for by-passing in low-power, high-frequency applications.



**Transmitting and High Voltage**

Ideal for equipment requiring close-held oscillator frequencies and prime or secondary standards. Extremely low power factor and stable retrace characteristics. Eleven terminal styles. Capacitance: 3 to 1000 mmf; 5 KV to 40 KV d-c. For high-frequency, high-voltage uses.



**Feed-Thru (FT) and Miniature Feed-Thru (MFT)**

Designed for single-hole mounting with ground to chassis or shield. Type FT (500 to 2300 mmf) has .050" hooked terminals for easy soldering. Bushing mounted. Type MFT (50 to 1000 mmf) eyelet-mounted. Smallest available in the widest capacitance range. Both types voltage-rated 500 v d-c.



**Ceramic and Steatite Trimmers**

Four types designed for greater stability to shock or vibration. Smaller, lighter, easier to mount in any position.

**Type 827 Molded Ceramic Trimmer**  
Miniature Size. Four capacity ranges: 2.5 to 50 mmf max.

**Type 823 Ceramic Trimmer**  
Medium-heavy steatite base. Eight capacity ranges: 5 to 125 mmf max. (Jan Type CV12).

**Type 822 Ceramic Trimmer**  
Medium weight steatite base. Five capacity ranges: 1.5 to 50 mmf max. (Jan Type CV11).

**Type 829 Tubular Ceramic Trimmer**  
Special for TV and VHF applications. Body only .215" dia. Lock-nut mounted. Five capacity ranges: .5 to 10 mmf max.

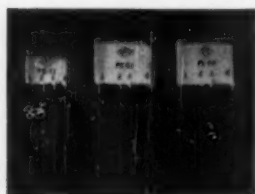
4

## PRINTED ELECTRONIC CIRCUITS — pioneered by Centralab, more than 30,000,000 in use

(Available singly or in kits)

### Small Plate Components

Smallest standard PEC's made by Centralab — excellent for miniature use. Minimum dimensions  $1\frac{1}{32}$ " x  $\frac{7}{32}$ " x  $\frac{7}{64}$ ". Capacitors 150 v d-c w. Resistors  $\frac{1}{8}$  watt. Plates available: single capacitors; dual capacitors; single resistors; dual resistors — in combinations; resistor-capacitor in series; resistor-capacitor in parallel. "Filpec," balanced diode load filter — has two capacitors and one resistor.



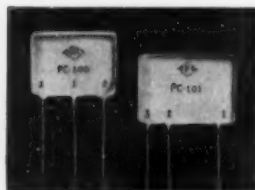
### Triode Couplates

Require only 4 soldered connections. Replace 5 components normally used in audio circuits. Are complete midjet assemblies of 3 capacitors and 2 resistors bonded to a dielectric ceramic plate. Available in four standard values. Resistors— $\frac{1}{8}$  watt; Capacitors — 400 v d-c w.



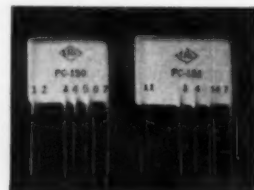
### Pentode Couplates

Require only 6 soldered connections. Completely new inter-stage coupling circuits of 3 capacitors and 3 resistors and a small 6-load ceramic base. Compared with predecessors they actually reduce soldered connections 50%. Only  $1\frac{1}{32}$ " x  $\frac{13}{16}$ " x  $1\frac{1}{64}$ ". Three standard values available.



### Vertical Integrators

Over 7 million in use in vertical integrator networks of TV sets produced by over 50 different set manufacturers. Two types available. Either type has only three external leads. Packaged one per envelope, five envelopes per carton.



### AUDET®

Extremely popular for miniature use. Furnish all values of all components generally found in output stage of a-c, d-c radio receivers. Provide 4 capacitors and 3 resistors — with only 7 leads. Available in two standard values. Resistors  $\frac{1}{8}$  watt; capacitors, 400 v d-c w.



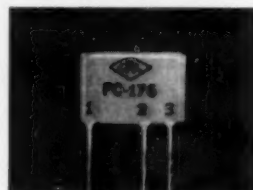
### PENDET®

Another Centralab "first" in Printed Electronic Circuits. Consists of 5 capacitors and 4 resistors in a single plate with only 9 leads. Similar to the popular Audet. Couples the diode triode and pentode tubes in output stage of a-c, d-c sets. Available in two standard values.



### Ampec® Amplifiers

Outgrowth of Centralab's constant research in PEC development. Excellent for sub-miniature high gain audio use. 3-stage speech amplifier smaller than cover of ordinary book matches. Size:  $1\frac{1}{32}$ " x  $\frac{13}{16}$ " x  $1\frac{1}{64}$ ". Capacitors, 100 v d-c w. Resistors,  $\frac{1}{8}$  watt.



### Special Plates

Many popular, non-standard plates used by radio and TV manufacturers are furnished as "special replacements" for servicing.

5

## FINE CERAMICS — engineered to give you excellent electrical and physical properties

### STEATITE CERAMIC INSULATORS

— 57 stock types packaged

Standard line includes: spreaders — strain insulators; standoff or pillar insulators; feed-through insulators; fish spine beads; through-panel bushings. All items are grade L-5 steatite, approved without limitation for Army and Navy use. Centralab Steatite Ceramic is to the ceramic field what "Lenox" china is to the fine china field.

### JAN-TYPE CERAMIC STANDOFFS —

Complete line as per JAN-1-8 and JAN-1-10 in stock for immediate delivery. Five styles, 79 JAN-types available in quantities. Bulletin 42-181A has complete data... send for your free copy.

You can buy all these Centralab "safest for guaranteed servicing" components from your authorized CRL distributor. See him often for all your industrial electronics, TV and radio servicing needs. In the meantime, make sure you have a copy of Catalog No. 28, containing newest revised data on hundreds of available combinations. Ask your distributor for your copy, or write direct.



# Centralab

A division of Globe-Union Inc.  
910-L EAST KEEFE AVENUE, MILWAUKEE 1, WISCONSIN  
In Canada, 804 Mt. Pleasant Road, Toronto 12, Ontario

RADIO & TELEVISION NEWS





## *"I'm glad I waited..."*

*Here's how I solved a problem that bothered me . . . and may be bothering you.*

Many of my favorite recordings happen to be 78's. They mean as much to me as any of my newer LP's or 45's. Changing pickups was often a real nuisance—and yet I wasn't willing to give up the superior quality of my two Pickering cartridges.

Last fall my dealer offered a suggestion. "Wait a little longer," he said. "You'll be glad you did."

He was right. I now have Pickering's new turn-over cartridge. A simple flip of the handy lever and I'm ready to play any favorite that fits my mood—whether it's standard or microgroove. *More than that, I'd swear my recordings sound better than ever.*

*I'm glad I waited . . . but you won't have to.*

Ask your dealer to show you this convenient new turn-over cartridge. Have him demonstrate it. See if you, too, don't hear the difference!

**PICKERING** and company incorporated • Oceanside, L. I., New York

**PICKERING PROFESSIONAL AUDIO COMPONENTS**

*"For those who can hear the difference"*

...Demonstrated and sold by Leading Radio Parts Distributors everywhere.  
For the one nearest you and for detailed literature, write Dept. C-3



# MY GRADUATES ARE EARNING GOOD PAY!



"I'll always be grateful to your training which helped me get my present fine position as Assistant Parts Manager."  
—Norman Weston



"Thanks to your training, I qualified for a good job as a Receiver Tester."  
—Paul Frank Seiler



"Your excellent instruction helped me get my present job as an airport radio mechanic."  
—Eugene E. Bosko



"I'm making good money in my own business, repairing and installing radio and TV sets — thanks to your training."  
—Irwin Polansky



# YOU, TOO, CAN MAKE BIG PAY IN TELEVISION NO EXPERIENCE NECESSARY

L. C. Lane, B.S., M.A.  
President: Radio-Television Training Association  
Executive Director: Pierce School of Radio & Television

**ENOUGH EQUIPMENT TO SET UP YOUR HOME LABORATORY!** As part of your training, I give you ALL the above equipment you need and more to prepare for a BETTER PAY TV job. You build and keep a professional **GIANT SCREEN TV RECEIVER** complete with big picture tube, takes any size up to 21-inch... also a Super-Het Radio Receiver, RF Signal Generator, Combination Voltmeter-Ammeter, Ohmmeter, C-W Telephone Transmitter, Public Address System, AC-DC Power Supply. Everything supplied including all tubes!

**MORE MONEY AND A CAREER ARE WAITING FOR YOU HERE!**

**EXPERT FM-TV TECHNICIAN TRAINING! SAVE VALUABLE TIME!** My FM-TV Technician Course can save you months of training if you have previous Armed Forces or civilian radio experience! Train at home with kits of parts, plus equipment to build **BIG SCREEN TV RECEIVER**, and **FREE FCC Coaching Course!** ALL FURNISHED AT NO EXTRA COST!

**FREE FCC COACHING COURSE!** Important for BETTER PAY JOBS requiring FCC License. You get this training AT HOME and AT NO EXTRA COST Top TV jobs go to FCC licensed technicians.

**NEW! PRACTICAL TV CAMERAMAN & STUDIO COURSE!** (For men with previous radio and TV training) I train you at home for a big pay job as the man behind the TV camera. Work with TV stars in TV studios or "on location" at remote pick-ups! A special one-week course of practical work on TV studio equipment at Pierce School of Radio & TV, our associate resident school in New York City, is offered upon your graduation.

**GOOD SPARE TIME EARNINGS!** Almost from the very start you can earn extra money while learning, repairing Radio-TV sets for friends and neighbors. Many of my students earn up to \$25 a week... pay their entire training from spare time earnings... start their own profitable service business. *Act now!*

**OPTIONAL: TWO WEEKS TRAINING IN NEW YORK CITY AT NO EXTRA COST!** You get two weeks, 50 hours, of intensive Laboratory work on modern electronic equipment at our associated school in New York City — Pierce School of Radio and Television. And I give you all this AT NO EXTRA COST whatsoever, after you finish your home study training in the Radio-FM-TV Technician course and FM-TV Technician Course.



**CIVILIANS! VETERANS! PREPARE FOR A BRIGHTER FUTURE AS A TRAINED TV TECHNICIAN!** Thousands of new jobs in TV are opening up in every state as new stations go on the air. You too can take your place in America's booming TELEVISION and Electronics industries... enjoy the success and happiness you always wanted. Keep your present job while I prepare you at home for a life-time career as a trained TV Technician. You "learn-by-doing" with the actual parts and equipment I send you... the same successful methods that have helped hundreds of men — many with no more than grammar school training — master television!

**LEARN ALL ABOUT COLOR TV.** I give you the latest principles and practical training in TV COLOR!

**FREE**  
SAMPLE LESSON

**FREE**  
HOW TO MAKE MONEY IN TV

**FREE**  
TV JOB OPPORTUNITIES LIST

**FREE**  
48-STATE LIST OF FUTURE TV STATIONS

**NO SALESMAN WILL CALL!**

**MAIL COUPON FOR 4 FREE AIDS!**  
NO OBLIGATION WHATSOEVER!

# VETERANS!

My schools fully approved to train veterans under new G.I. Bill! If discharged after June 27, 1950 — **CHECK COUPON!** Also approved for **RESIDENT TRAINING** in New York City at Pierce School of Radio and Television... qualifies you for full subsistence allowance up to \$160 per month. Write for details.

**RADIO-TELEVISION TRAINING ASSOCIATION**  
52 EAST 19th STREET, NEW YORK 3, N. Y.  
Licensed by the State of New York Approved by the VA

Mr. Leonard C. Lane, President  
RADIO-TELEVISION TRAINING ASSOCIATION  
52 East 19th Street, New York 3, N. Y.

Dear Mr. Lane: Mail me your **NEW FREE BOOK, FREE SAMPLE LESSON**, and **FREE** aids that will show me how I can make **BIG MONEY IN TELEVISION**. I understand I am under no obligation and no salesman will call.  
(PLEASE PRINT PLAINLY)

NAME \_\_\_\_\_ AGE \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

I AM INTERESTED IN:  
☐ Radio-FM-TV Technician Course  
☐ FM-TV Technician Course  
☐ TV Cameraman & Studio Course  
**VETERANS! Check here for Training under NEW G.I. Bill**

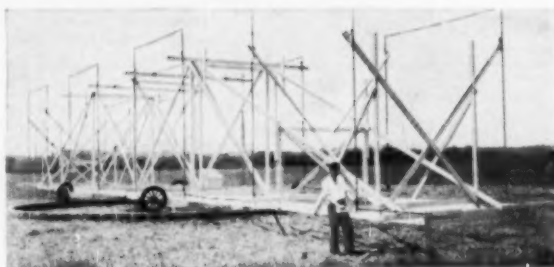


## *How silent is the night?*

Watching the serenity of Christmas skies, we are conscious of deep silence. Yet the stars are talking to us all the while—talking in radio waves that are full of meaning to scientists probing the depths of space.

The important discovery that some stars produce radio waves was made by a Bell Laboratories scientist while exploring atmospheric disturbances which might interfere with transoceanic telephone service.

His discovery marked the birth of the fast-growing science of radio astronomy. It is telling us of mysterious lightless stars that broadcast radio waves, and it promises new and exciting revelations about the vast regions of space concealed by clouds of cosmic dust.



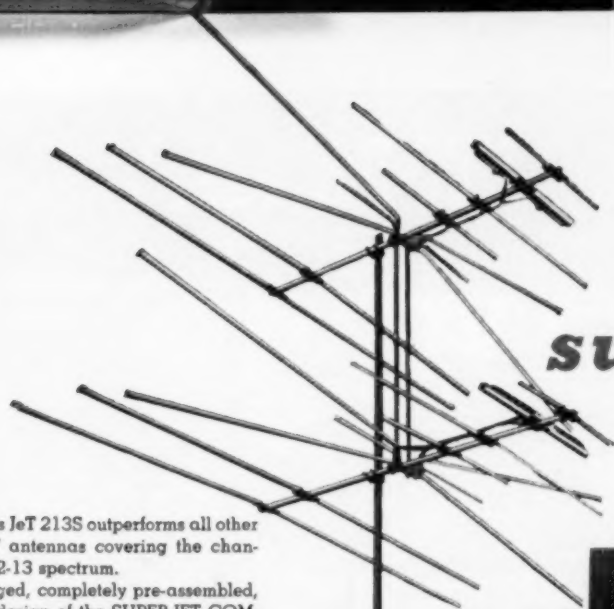
Directional radio antenna used by Karl G. Jansky, in the discovery of stellar radio signals at the Holmdel, New Jersey, branch of Bell Telephone Laboratories. In 1932 he detected waves of 14.6 meters coming from the direction of Sagittarius in the Milky Way.

It is another example of how Bell Telephone Laboratories scientists make broad and important discoveries as they seek ways to make your telephone serve you better.



**BELL TELEPHONE LABORATORIES**

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE.



## THE JFD *super-jet*

JFD's JeT 213S outperforms all other VHF antennas covering the channel 2-13 spectrum.

Rugged, completely pre-assembled, the design of the SUPER-JET COMBINES THE BEST OF BOTH THE BALINE YAGI AND THE JeTENNA for unequalled deep fringe performance and flat-high gain no-dip response.

Narrow side lobes in the SUPER-JET provide highly directive UHF coverage equal in gain to stacked bowtie and reflector. An extra feature at no extra cost.

*Delivers single 10-element Yagi performance on each channel.*  
Write for Form 230.

### HERE ARE THE FACTS— COMPARE FOR YOURSELF.

JFD JeT 213 S	Competitor D CHS 2-13 YAGI	Competitor C RADAR SCREEN TYPE B	Competitor B RADAR SCREEN TYPE A	Competitor A MATTHEWS (4 STACK)	CHANNELS
6.5	4.50	0.75	0.0	4.0	2
7.5	5.00	3.25	3.0	5.0	3
9.5	5.75	4.5	4.0	7.0	4
8.5	3.00	3.5	3.25	6.25	5
8.5	2.50	3.5	3.0	5.0	6
11.0	3.50	6.0	4.5	5.25	7
11.0	1.00	7.0	7.0	6.0	8
12.0	0.0	6.5	7.0	5.25	9
12.0	.875	7.75	8.0	7.25	10
11.25	.875	8.0	10.0	9.25	11
12.75	.50	7.5	10.0	6.5	12
12.0	7.5	6.0	9.0	7.0	13
DB GAIN					
YES	NO	NO	NO	NO	1" Square Cross Arm Completely Pre-Assembled
YES	NO	NO	NO	YES	
\$42.50	\$65.90	\$47.50	\$34.95	\$55.00	LIST PRICE

Model JeT 213 • single • \$20.75 list  
Model JeT 213S\* • stacked • \$42.50 list  
\*Complete with stacking transformers.

World's largest manufacturer of TV antennas and accessories.

# outperforms across the nation

JFD MFG. CO.



BROOKLYN 4, N. Y.

Burton Browne adv

# 15 reasons why VEE-D-X IS YOUR BEST CHOICE

## UHF ANTENNAS



**MODEL BT-U** — The aristocrat of Bow-Tie antennas. Superior in both construction and performance. Can be stacked for extra gain. Compare!



**MODEL CA-U** — Famous Co-linear that has highest gain of all broad band fringe area UHF antennas. Also available in Dual Jr. models for specific area requirements.



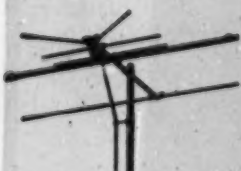
**MODEL COR-U** — The Corner Reflector has 40% higher gain than a single Bow-Tie. Finest construction with rugged Fiberglas boom and solid aluminum elements. Minimizes preb-ing.



**MODEL LJ-U** — The UHF Long John. Single-channel, 8-element yagi for primary and fringe areas. Compact, efficient, pre-assembled, easy-to-install.



**MODEL LI-U** — The most powerful of all single channel UHF antennas. Has rugged Fiberglas boom and solid aluminum elements.



**MODEL UQT** — Famous Ultra Q-Tee all-channel (2-83) UHF VHF antenna. Has printed circuit filters — Ideal for primary areas.

\*Lic. A.A.K. Pat. 2,422,458; 2,383,292; 2,611,084; others pending.

## 3 NEW IMPROVED MODELS OF THE FAMOUS VEE-D-X MIGHTY MATCH

Finest Most Efficient Cross-over Network Filters Ever Perfected



**NEW MM-40** — (Yellow case) (For combining separate UHF and VHF antennas to a single transmission line.) New, more efficient patented\* printed circuit. Amazingly low insertion loss. New type terminals. New moisture-resistant case.



**NEW MM-40A** — The ideal single line termination filter for use at set or converter having separate terminals for UHF and VHF. Patented\* printed circuit.



**NEW MM-25** (green case) — Permits the use of a single transmission line between separate high and low channel VHF antennas. New improved patented\* printed circuit. Amazingly low insertion loss. New type terminals. New moisture-resistant case.



NEW VEE-D-X

UNIVERSAL LIGHTNING ARRESTER

For UHF — VHF — AM — FM  
Takes all popular transmission lines  
Flat tubular oval round open wire

**MODEL ULA** is the finest, most efficient lightning arrester ever perfected. Completely eliminates the need for separate lightning arresters for each type of transmission line. This one arrester takes 'em all. Compact, clean-cut, inexpensive and employs newly developed printed circuits. It literally obsoletes all other lightning arresters.



## FREE

Write for your copy of this complete new 36 page pocket guide to the world's finest antenna systems.

## VEE-D-X tra Special



the one and only all-channel yagi

Model SP

## HIGH GAIN FRONT-TO-BACK DIRECTIVITY

Think of it — all the desirable features of a yagi — yet with all-channel performance in a single, easy-to-install antenna. Technically, the VEE-D-X tra Special is a 9-element hi-low yagi (5-elements on high channel — 4 on low) "T" matched. The hi-low sections are phased together with a new isolation filter MM-25. The ideal antenna for all-channel power — for directivity — and for eliminating interference from unwanted stations. A honey for use with VEE-D-X Rotator.



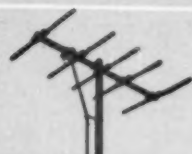
NEW VEE-D-X ANTENNA ROTATOR

Acclaimed the finest in design, construction and performance. Clean-cut, in-line styling. Fast and easy to install. Beautifully styled Control Console operates with convenient downward pressure. Choice of two colors.

## VHF ANTENNAS



**MODEL JC** — For the most powerful single channel performance. A popular 3-element yagi. Easy-to-install.



**MODEL DC** — The famous VEE-D-X low cost 3-element yagi with original VEE-D-X Delta Match construction.



**MODEL DX** — The famous economy super power yagi. Has 30% higher gain on high channels than any other 10-element yagi. Delta Match and boom braced.



**NEW BROAD BAND YAGIS** — Finest of all. Available in both 10-element "X" series and 5-6 element "V" series, each in 2 cuttings, cover entire VHF channel range.



**MODEL QT** — The brilliant Q-Tee all-channel VHF antenna with patented\* printed circuit channel separators. New improved construction and performance. Can be stacked for additional gain.

**LaPointe ELECTRONICS INC.**

ROCKVILLE, CONNECTICUT

N-12

Send ..... copies of your new complete antenna booklet.

NAME .....

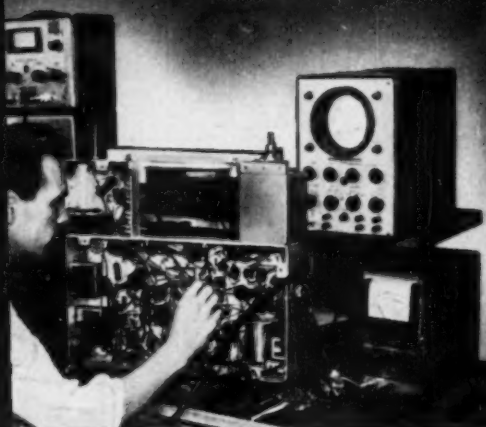
STREET .....

CITY ..... ZONE ..... STATE .....

RADIO & TELEVISION NEWS

**For opportunities within your reach**

# See what the RCA TV Servicing Course offers you



## Good-pay jobs. A business of your own.

OPPORTUNITIES FOR GOOD-PAY JOBS in Television are within your reach when you study TV Servicing by the RCA Institutes Home Study Method. Or perhaps you would like to start a TV Service business of your own.

If you are not satisfied with the way your future now stacks up, see how easily

you can change the course of your career. RCA Institutes Home Study Course in TV Servicing is helping thousands of other people to better jobs. It can help you. Right now thousands of opportunities are going begging. There is a critical shortage of trained TV servicemen. This is *your* big opportunity.

## Easy-to-understand, illustrated lessons



The entire course is divided into ten units of several individual lessons. You study them at home in your spare time.

Lesson-by-lesson you learn the theory and step-by-step procedures of installing TV antennas, of servicing and trouble-shooting TV receivers. Hundreds of pictures and diagrams help you understand the how-it-works information and the how-to-do-it techniques. You will be amazed how easily you absorb the knowledge of each lesson, how quickly you train yourself to become an experienced technician.

## Experienced engineers and faculty prepared the course, grade your lessons



The RCA Institutes course was written and planned by instructors with years of specialized

experience in training men by home-study and resident-school methods. The course embodies RCA's background of television experience plus knowledge gained in training several thousand technicians. A study of the course parallels an apprentice's training. Your lessons are carefully examined and accurately graded by friendly teachers who are interested in helping you to succeed.

## One of the leading and oldest Radio-Television training schools



Founded in 1909, RCA Institutes, Inc. has been in continuous operation for the past 44 years. Its

wide experience and extensive educational facilities give students, just like you, unsurpassed technical training in the highly specialized field of radio-television-electronics.

RCA Institutes is licensed by the University of the State of New York . . . an affiliate member of the American Society for Engineering Education . . . approved by the Veterans Administration . . . approved by leading Radio-Television Service Organizations.

## It costs so little to gain so much

RCA Institutes makes it easy for you to take advantage of the big opportunities in TV Servicing. The cost of the TV Servicing Home Study Course has been cut to a minimum. You pay for the course on a pay-as-you-learn unit lesson basis. No other home study course in TV Servicing offers so much for so little cost to you.

RCA Institutes conducts a resident school in New York City offering day and evening courses in Radio and TV Servicing, Radio Code and Radio Operating, Radio Broadcasting, Advanced Technology. Write for free catalog on resident courses.



**RCA INSTITUTES, INC.**  
A SERVICE OF RADIO CORPORATION OF AMERICA  
350 WEST FOURTH STREET, NEW YORK 14, N.Y.

**SEND FOR FREE BOOKLET**—Mail the coupon—today. Get complete information on the RCA INSTITUTES Home Study Course in Television Servicing. Booklet gives you a general outline of the course by units. See how this practical home study course trains you quickly, easily. Mail coupon in envelope or paste on postal card.



### MAIL COUPON NOW!

RCA INSTITUTES, INC., Home Study Dept. RN1253  
350 West Fourth Street, New York 14, N.Y.

Without obligation on my part, please send me copy of booklet "RCA INSTITUTES Home Study Course in TELEVISION SERVICING." (No salesman will call.)

Name \_\_\_\_\_ (please print)

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



# CHANNEL MASTER

*introduces a*

basically new type  
of VHF antenna

# CHAMPION\*

the highest gain  
all-channel VHF antenna  
ever developed!

*Featuring the unique new "Tri-Pole"*

#### TRIPLE-POWERED DIPOLE

The "Tri-Pole" is a new antenna system in which the Low Band folded dipole also functions as three folded dipoles tied together in phase on the High Band. This is the heart of the Champion, the secret of its phenomenal performance on all 12 VHF channels.

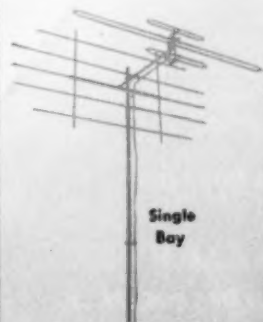
# *the* CHAMPION *is* the most sensitive all-channel VHF antenna ever designed!

Stacked CHAMPION provides:  
11-13 D B High Band gain  
6½-7½ D B Low Band gain

Here is a totally NEW kind of antenna, completely different — in principal and performance — from any VHF antenna you've ever seen! Since the lifting of the TV freeze means a gradual disappearance of the single-channel VHF area, the VHF antenna of the future will be a multi-channel antenna. Prepare now for outstanding reception on all VHF channels — present and future — with Channel Master's super-sensitive CHAMPION! Outperforms every all-channel VHF antenna made today — and many Yagis, too!

## COMPARE these features with the antenna you are now using:

- Folded dipoles throughout — give close to 300 ohms impedance across the entire band.
- Screen-type reflector provides high uniform gain on every channel, 2 through 13. Not frequency sensitive — this reflector provides more than twice as much extra gain as straight bar reflectors.
- Phase-correcting harness is built-in and fully assembled; the only wiring you do is to attach the lead-in.
- All-aluminum construction . . . lightweight, durable, non-corrosive.



Single Bay

## MARVEL OF PRE-ASSEMBLY

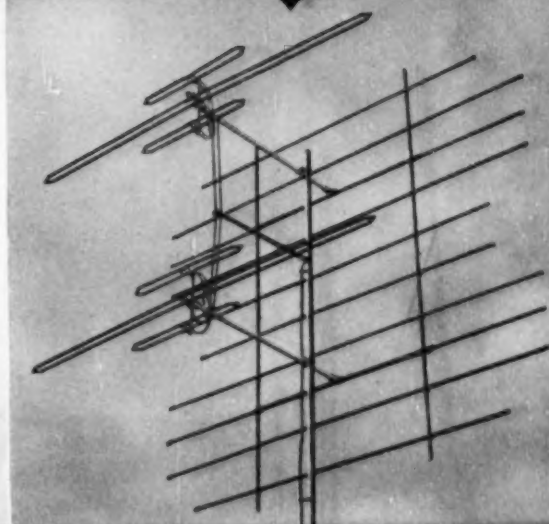
assembles faster than a  
5-element yagi!

Collapsed "Pop-Up" screen opens instantly — no loose rods, elements or hardware. "Tri-Pole" assembly features automatic Spring Lock Action — all dipoles snap permanently into place without wing nuts or any other hardware.

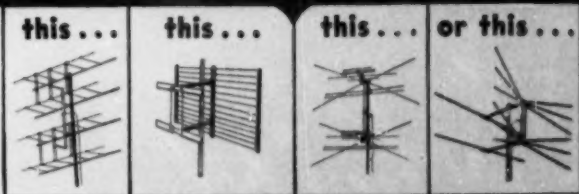
It's a CHAMPION in any area!

1-bay—local areas  
2-bay—secondary and fringe areas  
4-bay—super-fringe areas

## THIS ANTENNA...



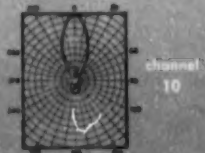
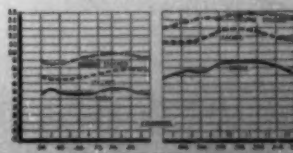
## OUT-PERFORMS:



The 2-Bay CHAMPION actually  
gives you the performance of:

• Separate 5-element  
Yagis for every Low  
Band channel!

• Separate 10-element  
Yagis for every High  
Band channel!



Model No.		List Price
325	Single Bay	\$20.83
325-2	2-Bay	\$42.36
325-4	4-Bay	\$88.99
Separate Stacking Harness		
325-3	2-Bay Harness	\$ 2.00
325-5	4-Bay Harness	\$ 4.15

Send for complete technical literature.

**CHANNEL MASTER CORP.**

ALBANY, N. Y.



# *Symbol* of superior speaker performance

RCA Speakers—quality engineered for superior performance—are now clearly identified by this distinctive gold label. It is your assurance that these speakers represent the superior technical "know-how" and manufacturing techniques that

have made RCA the accepted name for high-quality products.

Look for the gold label—symbol of superior speaker performance—and be sure of using only genuine RCA Speakers for your replacement needs.

*For complete information on RCA Speakers, see your RCA Distributor.*



**RADIO CORPORATION of AMERICA**  
**ELECTRONIC COMPONENTS**

**HARRISON, N. J.**

# CREI prepares you quickly for success in

*The future is in your hands!*

The signs are plain as to the future of the trained men in the electronics industry. It is a tremendous industry, and—at the *present time* there are more jobs than there are trained men to fill them. But—when there's a choice between a trained and untrained applicant, the trained man will get the job. Your biggest problem is to decide on—and begin the best possible training program.

## CREI Home Study . . . The Quick Way to Get There.



Since 1927, CREI has given thousands of ambitious young men the technical knowledge that leads to more money and security. The time-tested CREI procedure can help you, too—if you really want to be helped. CREI lessons are prepared by experts in easy-to-understand form. There is a course of instruction geared to the field in which you want to specialize. You study at your convenience, at your rate of speed. Your CREI instructors guide you carefully through the material, and grade your written work personally (not by machine).

## Industry Recognizes CREI Training.

CREI courses are prepared, and taught with an eye to the needs and demands of industry, so your CREI diploma can open many doors for you. Countless CREI graduates now enjoy important,

good-paying positions with America's most important companies. Many famous organizations have arranged CREI group training for their radio-electronics-television personnel. To name a few: All America Cables and Radio, Inc.; Canadian Aviation Electronics, Ltd.; Canadian Broadcasting Corporation; Columbia Broadcasting System; Canadian Marconi Company; Hoffman Radio Corporation; Machlett Laboratories; Glenn L. Martin Company; Magnavox Company; Pan American Airways, Atlantic Division; Radio Corporation of America, RCA Victor Division; Technical Appliance Corporation; Trans-Canada Air Lines; United Air Lines. Their choice for training of their own personnel is a good cue for your choice of a school.



**Benefits Felt  
Right Away.**

Almost immediately, you feel the benefits of CREI training. Your employer, when informed of your step toward advancement (only at your request), is certain to take new interest in you and in your future. What you learn in CREI Home Study can start helping you do a better job immediately.

☐ BROADCASTING  
☐ TELEVISION  
☐ MANUFACTURING  
☐ COMMUNICATIONS  
☐ SERVICING  
☐ AERONAUTICAL  
ELECTRONICS



## CREI also offers Resident Instruction

at the same high technical level—day or night, in Washington, D. C. New classes start once a month. If this instruction meets your requirements, check the coupon for Residence School catalog.

## INFORMATION FOR VETERANS

If you were discharged after June 27, 1950—let the new G. I. Bill of Rights help you obtain resident instruction. Check the coupon for full information.

## Get this fact-packed booklet today. It's free.

Called "Your Future in the New World of Electronics," this free illustrated booklet gives you the latest picture of the growth and future of the gigantic electronics world. It includes a complete outline of the courses CREI offers (except Television and FM Servicing) together with all the facts you need to judge and compare. Take 2 minutes to send for this booklet right now. We'll promptly send your copy. The rest—your future—is up to you.



## CAPITOL RADIO ENGINEERING INSTITUTE

An Accredited Technical Institute • Founded in 1927

3224 16th Street, N.W.

Washington 10, D.C.

### MAIL COUPON TODAY

#### CAPITOL RADIO ENGINEERING INSTITUTE

Dept. 1112, 3224 16th St., N.W., Washington 10, D. C.

Send booklet "Your Future in the New World of Electronics" and course outline.

CHECK FIELD OF GREATEST INTEREST ☐ TV, FM & Advanced AM Servicing ☐ Aeronautical Radio Engineering  
☐ Practical Radio Engineering ☐ Broadcast Radio Engineering (AM, FM, TV)  
☐ Practical Television Engineering

Name.....

Street.....

City.....Zone.....State.....

Check—☐ Residence School ☐ Veteran

**What the well-dressed window is wearing**

**Radio Supplies, Inc.**

The window display for Radio Supplies, Inc. features two men in suits examining a large, open box labeled "Craftsman Assembly" and "high fidelity home music system". The display includes various electronic components like speakers, a turntable, and a radio receiver, each with a price tag. The background shows shelves stocked with more electronic equipment.

Price tags visible in the display:

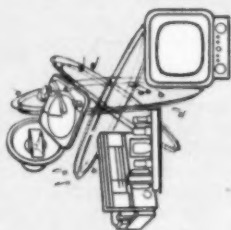
- C-20
- C-10
- C-400
- C-30

It's all up and down the street—the new Craftsman CA-1 "ASSEMBLY" High Fidelity Home Music System and its eye-catching, sales-building window display. An unbeatable combination of Craftsman quality and visual appeal that's paying off in big sales (and satisfied music lovers) everywhere!

high fidelity by craftsman

means distinctly better listening

The Radio Craftsman, Inc., 4401 N. Ravenswood Ave., Chicago 40, Ill.



developed Automatic Frequency Control. High sensitivity for fringe areas.

4. **C400 Amplifier** offers exceptional performance at low cost. Frequency response: 15-20,000 cps, less than 1% distortion.
5. **C30 Three-speed Record Player** features chrome face plate, dual-tape drive, variable reluctance pickup. Specially designed.

1. **Six-piece window display** in color, die-cut for attention value. Small note cards can be used individually (available for all products) on counter shelf or window.
2. **C20 Coaxial Speaker**, specially designed to Craftsman specifications. 12" woofer and horn tweeter, self-contained crossover network.
3. **C10 FM-AM Tuner** features Craftsman-

**ISADORE WABER** is the new vice-president in charge of sales for **C-B-C Electronics Co., Inc.**, of Philadelphia.

Before assuming his new post, he was advertising and sales promotion manager for **Radio Electric Service Co.** of Philadelphia. Prior to three years of war service, he was a merchandiser for a drug chain.

In his new post he will have charge of the company's sales and advertising program.



**PIONEER ELECTRONICS CORP.** has opened a new plant in West Los Angeles which will provide 30,000 square feet of manufacturing space. The company plans to turn out 1000 picture tubes a day from the new facility . . . **HAMMARLUND MANUFACTURING COMPANY, INC.** of New York has opened a Chicago office to handle midwest sales and servicing. Ray Ramon will be in charge of the new office at 605 N. Michigan Avenue . . . **ALCO ELECTRONICS MFG. CO.** has moved to 3 Wolcott Avenue in Lawrence, Mass. . . . The **RCA VICTOR DIVISION** has acquired a new, modern warehouse in Dallas, Texas to improve and speed its service to distributors of electron tubes, components, and radio batteries. The new warehouse is at 130 Express St. in Dallas . . . **AUDIOTRONICS SUPPLY COMPANY** has moved to 1834 N. Claiborne Street in New Orleans . . . **CHESTER CABLE CORPORATION** has completed a new wing at its Chester, N. Y. plant which will provide an additional 25,000 square feet of production space . . . **WILCOX-GAY CORPORATION** has constructed two one-story additions to its Charlotte, Michigan plants which add 25,000 square feet of manufacturing floor space to its Charlotte facilities . . . **HOFFMAN RADIO CORPORATION** of Los Angeles has opened a new plant in Kansas City which will be devoted primarily to the production of radio receivers. The firm discontinued radio production three years ago but will resume after January 1st. . . . **CAL-TRONICS CORPORATION** has moved to a new plant at 11307 Hindry Ave. in Los Angeles. The building contains 20,000 square feet of floor space and the company's entire operation will be housed there . . . **PRECISE DEVELOPMENT CORPORATION** has acquired additional space at 980 Long Beach Road in Oceanside, L. I. to handle the increased production of its line of test equipment kits and wired

models . . . **STEELMAN PHONOGRAPH AND RADIO COMPANY** has recently added space to permit it to treble its production of phonographs. The factory area now covers 50,000 square feet . . . **GRIES REPRODUCER CORP.** has moved to new and expanded quarters at 125 Beechwood Avenue, New Rochelle, N. Y. . . . **SYNTRONIC INSTRUMENTS, INC.** of Addison, Ill. has recently doubled its production space with the addition of a new wing. The space is being used for the manufacture of TV yokes and other of the company's components . . . **MOTOROLA INC.** is constructing two new plants on North Cicero Avenue near North Avenue in Chicago to house its manufacturing and parts and service departments. The twin one-story plants will provide 150,000 square feet of space.

**WILLIAM L. DUNN**, former vice-president of the television and radio division of **Raytheon Manufacturing Company**, has been elected president of **Magnecord, Inc.** He succeeds Glenn D. Roberts who is retiring.



Mr. Dunn had been associated with the **Raytheon** organization and its subsidiary, **Belmont Radio Corporation**, for 21 years. He joined **Belmont** in 1933 as chief engineer and was named general manager of the special products division in 1940. He was elected vice-president in 1945 when **Belmont** became a subsidiary of **Raytheon**.

He is a member of the IRE, Society of Military Engineers, Merchants and Manufacturers Club, The Executive's Club of Chicago, and The Navy League.

**AUDIO DEVICES, INC.** has acquired the assets and goodwill of **ADVANCE RECORDING PRODUCTS CO.**, Long Island City manufacturer of recording disc blanks for radio stations, recording studios, and record producers . . . Two of the largest divisions of **AEROVOX CORPORATION** have been merged in combining the **WILKOR** resistor manufacturing operation with the ceramic condenser operation of the "HI-Q" division. The combined operations will be known as the "HI-Q" Division . . . **GRAYBURNE CORPORATION**, manufacturers of the "Vari-Loopstick" and "Ferri-Loopstick," has changed its corporate name to **RAYBURNE CORPORATION** in order to avoid confusion with a company of similar name in the



the Moderne  
Model UR-312 Available in Cherry  
Mahogany, Blond Mahogany,  
or Lined Oak.  
User Net: \$ 64.50  
Blond and Lined Oak—10% extra

**LOOK** at the styling ...  
**LISTEN** to the reproduction ...

the new *Musicorner*  
by UNIVERSITY



the Traditional  
Model UR-311.  
In Cherry or  
Cordovan Mahogany.  
User Net: \$ 64.50

Now you can have good "looking" with good listening! Each University MUSICORNER design is authentic in every detail, and reflects the traditions of the old masters of fine furniture. All genuine woods—hand rubbed! Designed to flatter the decor with stylings that smartly blend with any existing interior.

University Musicorner gives you wide angle coverage, clarity and brilliance with its full front radiation. High power handling ability and distortion control, with an internal and extended horn. And, boosted low frequency response with high efficiency, from its unique integral bass reflex system.

THE HEART OF THE *Musicorner*

Model 6201, 12" coaxial speaker system. A TRUE coaxial dual range system, with woofer, and driver type tweeter, built-in crossover network, and "balance" control. Finest to be had! User Net: \$ 45.00

The exclusive University Diffusicone-12 speaker is acclaimed by experts everywhere! Here, in the economy of one speaker you get dual-horn loading, radial projection, and diffraction—to give unsurpassed fidelity, range, and uniform sound distribution. User Net: \$ 27.00

Model 6200, 12" extended range speaker. Gives highly efficient full-bodied response throughout the operating spectrum. User Net: \$ 21.00

**FREE BOOKLET!**

describing these  
wonderful enclosures in  
greater detail.

*University* **LOUDSPEAKERS, INC.**

80 SOUTH KENSICO AVENUE • WHITE PLAINS, N. Y.

electrical distribution field. No changes in personnel or policies will be made ... **ACE ENGINEERING & MACHINE CO., INC.** and **RFI SHIELDED ENCLOSURES CORP.** both of Philadelphia have amalgamated to provide improved service to their customers ... **SOUTHEASTERN SALES CO.** of East Point, Georgia has changed its name to **PAUL HAYDEN ASSOCIATES** ... **NATIONAL SALES CO.**, 808 Raynor Ave., Joliet, Ill. has been established by Lee Williams to handle the sale and distribution of electrical and electronic components ... T. R. Slocum, Jr., formerly with the engineering divisions of **CONSOLIDATED VULTEE AIRCRAFT CORP.**, heads the newly-formed **CONTINENTAL ELECTRONICS CORPORATION**. The new firm will engage in the design and manufacture of electronic equipment.

**HARRY SCHECTER** has been named vice-president in charge of sales for **CBS-Columbia, Inc.**, the television receiver manufacturing subsidiary of **CBS**.



He has been general manager of **CBS-Columbia Distributors Inc.**, the New York factory distributing branch. A veteran of 23 years in the radio industry, Mr. Schecter brings to his new post wide experience in appliance sales, advertising, and merchandising at the retail, distributor, and manufacturer levels.

His successor in the distributing firm will be named shortly.

**RETMA** elected chairmen of the Radio-Television Industry Committee and the Electronics Industry Committee at its recent meet in New York.

Max F. Balcom, past president and a director of the association, was elected chairman of the Radio-Television Industry Committee, while Director F. R. Lack was elected chairman of the Electronics Industry Committee. Board Chairman Robert C. Sprague, who has been acting chairman of the RTIC, asked to be relieved of his duties so that he could maintain his impartiality between the two committees as chairman of the board.

The board also authorized the employment of a general manager and staff, if necessary, for the EIC. He will devote his full time to serving the interests of electronic manufacturers in RETMA.

**DAHL W. MACK**, newly-elected president of the National Electronic Distributors Association, has announced the formation of a permanent operating committee to handle NEDA's regional field workshop seminars authorized by the organization during its recent St. Louis convention.

The committee, chairmanned by W. D. Jenkins of **Radio Supply Co.**, Richmond, Va., includes: J. G. Prestwood, (Continued on page 174)

**RADIO & TELEVISION NEWS**



**I Send You  
18 BIG  
KITS  
OF RADIO-  
TELEVISION  
EQUIPMENT**

**Approved for  
Veterans Under  
the G. I. Bill**



**IF YOU ARE  
EXPERIENCED IN RADIO**

Men already in Radio who seek a short intensive 100% TELEVISION Training with FULL EQUIPMENT INCLUDED are invited to check and mail the coupon at the right.

# I'll Train YOU at Home in Your Spare Hours for Big Pay Job • Your Own Business • Exceptional Opportunity in RADIO-TELEVISION ON *New* NO-OBLIGATION PLAN!

**You Have NO MONTHLY  
PAYMENT CONTRACT  
to sign . . . you pay for your training  
as you learn and earn... ENROLL NOW!  
Be Ready in Little as 10 MONTHS!**

Now you can get into Radio-Television, today's fastest growing big money opportunity held, in months instead of years! My completely new "package unit" training plan prepares you to qualify as a Radio-Television Technician in as short a time as 10 months, or even less! I offer you my training with no monthly payment contract to sign—thus NO RISK and NO OBLIGATION for you! This is America's finest, most modern and really practical training. Includes FM . . . UHF Television and all the most recent developments. My training gets you ready to handle any practical job in the booming Radio-Television industry. Start your own profitable Radio-Television Service Shop . . . or accept a fine paying job. I have trained hundreds of successful Radio-Television technicians—and I can train you regardless of lack of previous experience. Mail coupon and get all the facts—FREE!

## VALUABLE EQUIPMENT INCLUDED WITH TRAINING

Much of your Sprayberry Training is actual construction, demonstration and experimentation. You get priceless practical experience this way. You build the 6 tube Sprayberry Short Wave and Broadcast Training Radio Receiver, the Sprayberry Television set, multi-range test meter, signal generator, signal tracer, cathode ray oscilloscope and many other projects. All this equipment is yours to keep. You have practically everything you need to set up your own profitable Radio-Television shop. All lessons and books I send you remain your own property.

## OUR 21st YEAR TRAINING MEN FOR RADIO-TELEVISION

### Earn Extra Money While You Learn

All your Sprayberry Training is given IN YOUR OWN HOME during your free time. Keep on with your present job and income while learning Radio-Television. With each Sprayberry "Package Training Unit" I include money-making plans and special "Business Builders" for spare time Radio-Television service jobs. New Television stations opening everywhere open big money opportunity for men to install UHF antennas—I tell you how! If you expect to be in the Armed Forces later, there is no better preparation than Radio-Television. Mail coupon below . . . get facts FREE. No salesman will call.

## FREE TO YOU 3 BIG RADIO-TELEVISION BOOKS

**I invite you to get all the facts—**

I want you to have ALL the facts—without cost! Rush coupon for my three big Radio-Television books! "How to Make Money in Radio-Television" PLUS my new illustrated Television Bulletin PLUS an actual sample Sprayberry Lesson—ALL FREE. No obligation and no salesman will call. Mail coupon NOW!

## SPRAYBERRY ACADEMY OF RADIO

111 NORTH CANAL STREET, DEPT. 25-D  
CHICAGO 6, ILLINOIS

**Mail  
Coupon  
Today!**

**NO OBLIGATION  
No Salesman  
Will Call**

**SPRAYBERRY ACADEMY OF RADIO, Dept. 25-D  
111 North Canal St., Chicago 6, Illinois**

Please rush to me all information on your 10-MONTH Radio-Television Training Plan. I understand this does not obligate me and that no salesman will call upon me. Be sure to include 3 books FREE.

Name  Age

Address

City  Zone  State

☐ Are you Experienced? ☐ No Experience

# 11 CPS to 30 Mc

... covered by two new RCA Companion Signal Generators for testing and trouble-shooting audio, AM, FM and TV equipment

## RCA WA-44A Audio Signal Generator

Continuous sine-wave coverage from  
11 cps to 100 kc

**ONLY \$8750** Suggested  
User Price

Features new RCA-type oscillator having wide frequency range, and frequency stability of  $\pm 3\%$  or better. Regulated power supply. Amplified agc circuit insures an output uniform within  $\pm 1$  db over entire frequency range. Total harmonic distortion, 2% or less. Has direct-reading scales. Can be used with high- or low-impedance circuits. Useful for all response measurements. Has separate line-frequency output for inter-modulation distortion measurements. Compact, weighs only 10 lbs. Ac-operated.



## RCA WR-49A RF Signal Generator

Continuous coverage on fundamentals  
from 85 Kc to 30 Mc

**ONLY \$5950** Suggested  
User Price

Features built-in dc blocking capacitors. Places no dc load on circuit under test ... protects instruments when connected to B-plus circuits. Cathode-follower output stage isolates oscillator from effects of load reactance and resistance, thereby maintaining good output waveform, voltage regulation, and frequency stability of the oscillator.

Built-in 400-cycle oscillator for internal modulation. Modulation percentage continuously variable. Dial calibrations accurate to  $\pm 1\%$  on all six bands. Complete shielding of copper-plated cabinet and of cables for minimum leakage. Compact, weighs only 8 lbs. Ac-operated.



**RADIO CORPORATION of AMERICA**  
TEST EQUIPMENT

HARRISON, N. J.

Get full details today from your RCA  
Distributor or clip the coupon and mail to:  
RCA Commercial Engineering  
Section 40KX  
Harrison, N. J.  
Please send me complete information on (check)  
☐ RCA WA-44A Audio Signal Generator  
☐ RCA WR-49A RF Signal Generator  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zone \_\_\_\_\_

# DISCOVER WHAT GOLD

# AND 2 INCHES OF AIR

# DO FOR

# 2

# NEW

# WALSCO ANTENNAS



AMAZING  
**3 YEAR**  
GUARANTEE

## ● NEW WALSCO GOLD DIPOLE YAGI (UHF)

No less than 24 kt. gold plating on the receiving dipole of this great, new, 10 element Yagi. Why gold? Because gold resists corrosion better than any other metal... and gold is an excellent conductor. Like the most powerful radar antennas, the Walsco Gold Dipole Yagi guarantees permanent high gain in any location, under all weather conditions. It's custom-made for each location. The *only* Yagi that carries a 3 year unconditional guarantee! And it costs no more than conventional Yagis.

## ● NEW WALSCO IMPERIAL CONICAL (VHF)

Here's the first radical improvement in Conicals. A new insulator which utilizes "barrier discs" and 2 inches of air space between the terminals prevents "shorts." Soot deposits, dirt, moisture, salt, etc., cannot affect the insulator. This great, new Conical will therefore maintain high gain performance under any and all weather conditions. Front-end hardware is stainless steel to prevent corrosion losses permanently. Takes only 2 minutes to assemble because there's no loose hardware. Nothing compares to the Walsco Conical at any price... and it's backed by the *only* 3 year unconditional guarantee!

Write for complete information

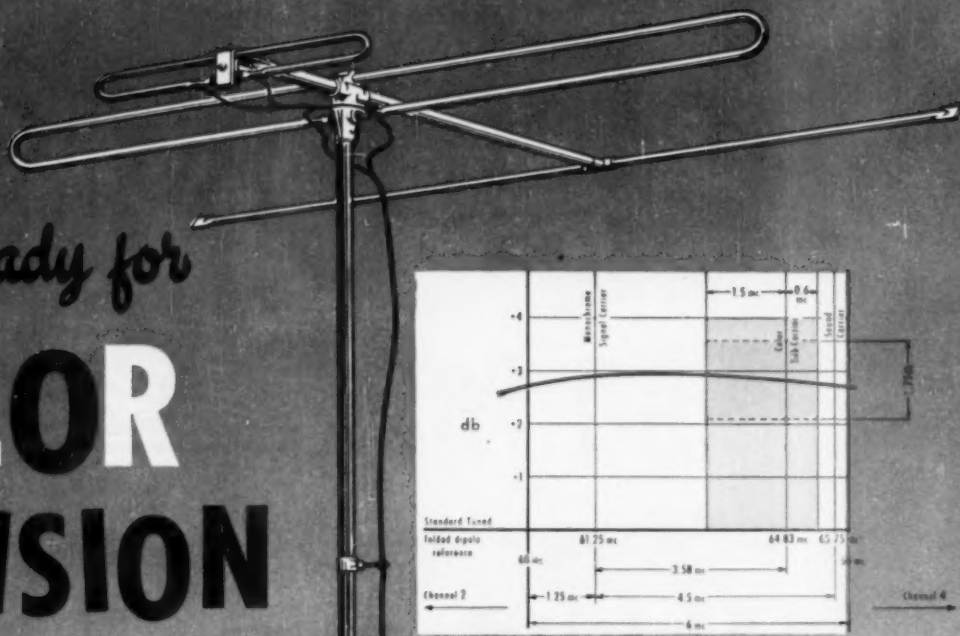
## WALSCO ELECTRONICS CORPORATION

3602 Crenshaw Boulevard, Los Angeles 16, California

you're ready for

# COLOR TELEVISION

with an AMPHENOL **—INLINE\***



Color television is fast becoming a reality! Sets are expected to be available the first part of next year and stations are purchasing the necessary transmitting equipment. Initial costs, unfortunately, will be high but as improvements in design and production are achieved the price of color television will become within everyone's reach.

The consumer is concerned with the problems presented by television in color. He has read reports on prices and availability; all have been conflicting. He knows, however, that his set will have to be replaced or converted. What he does not know is that if he has an AMPHENOL INLINE\*, there will be no extra expense in antenna or installation! AMPHENOL engineers provided for color in the original design of the INLINE\*.

Every dealer, distributor and installer will want to acquaint their customers with this reassuring information. The color television market is potentially tremendous. It certainly will prove of benefit if the consumer can be reassured on one part of the cost of conversion to color.

The fact that AMPHENOL INLINES are able to receive color television so well reflects favorably upon the engineering ability of AMPHENOL. For in ordinary black and white television the same level-gain design has proved valuable. Set owners know, now, that their AMPHENOL INLINE\* is providing them with the best black and white picture their sets can deliver.

\*Reissue U.S. Pat. No. 23,273

## Antenna Electrical Requirements for COLOR TELEVISION

Information now available on color television has made it clear that the receiving antenna must have these characteristics:

- 1 Antenna gain must be flat, no gain or loss greater than one db, within 1.5 mc below and 0.6 mc above the color sub-carrier\* (a width of 2.1 mc).
- 2 Antenna gain must be held down across the FM frequencies. Rejection of FM signals is much more important in color than in black and white television.

\*Channel frequency widths are at present divided between the monochrome amplitude modulation picture carrier and the frequency modulation sound carrier. The addition of the color sub-carrier is made at 3.58 mc above the monochrome carrier.

The AMPHENOL INLINE\* fully meets the two conditions listed above. Besides being engineered to reject FM signals, from 88 mc to 108 mc, the IN-LINE provides very level gain across all channels, particularly over the color sub-carrier. Typical of the INLINE's performance on all channels is the gain chart† illustrated above for channel 3.

†Measured in accordance with proposed RETMA standards.

AMERICAN PHENOLIC CORPORATION  
chicago 50, illinois

**AMPHENOL**

# ADVANCE! Raise your earning power—learn RADIO-TELEVISION-ELECTRONICS by SHOP-METHOD HOME TRAINING

## GOOD JOBS AWAIT THE TRAINED RADIO-TV TECHNICIAN

There is a place for you in the great Radio-Television-Electronics industry when you are trained as National Schools will train you at home!

Trained technicians are in growing demand at good pay—in manufacturing, broadcasting, television, communications, radar, research laboratories, home Radio-TV service, and other branches of the field. National Schools Master Shop-Method Home Training, with newly added lessons and equipment, trains you in your spare time, right in your own home, for these fascinating opportunities. OUR METHOD IS PROVED BY THE SUCCESS OF NATIONAL SCHOOLS TRAINED MEN, ALL OVER THE WORLD, SINCE 1905.

## EARN WHILE YOU LEARN

Many National students pay for all or part of their training with spare time earnings. We'll show you how you can do the same! Early in your training, you receive "Spare-time Work" Lessons which will enable you to earn extra money servicing neighbors' and friends' Radio and Television receivers, appliances, etc.



Signal Generator

T. R. F. Receiver

Audio Oscillator

**National Schools Training is All-Embracing**  
National Schools prepares you for your choice of many job opportunities. Thousands of home, portable, and auto radios are being sold daily—more than ever before. Television is sweeping the country, too. Co-axial cables are now bringing Television to more cities, towns, and farms every day! National Schools' complete training program qualifies you in all fields. Read this partial list of opportunities for trained technicians:

Business of Your Own • Broadcasting  
Radio Manufacturing, Sales, Service • Telecasting  
Television Manufacturing, Sales, Service  
Laboratories: Installation, Maintenance of Electronic Equipment  
Electrolysis, Call Systems  
Garages: Auto Radio Sales, Service  
Sound Systems and Telephone Companies, Engineering Firms  
Theatre Sound Systems, Police Radio  
And scores of other good jobs in many related fields.

## TELEVISION TRAINING

You get a complete series of up-to-the-minute lessons covering all phases of repairing, servicing and construction. The same lesson texts used by resident students in our modern and complete Television broadcast studios, laboratories and classrooms!



## MASTER ALL PHASES!

Get Master Shop-Method Home Training from an Established Practical Resident School with its own Training Shops, Laboratories, Studios — almost 50 Years of Successful Experience in Training Ambitious Men.

**We Bring National Schools To You!**



You also receive this Multitester

Superheterodyne Receiver

## FREE! RADIO-TV BOOK AND SAMPLE LESSON!

Send today for National Schools' new, illustrated Book of Opportunity in Radio-Television-

This course also offered in Spanish and Portuguese

Electronics, and an actual Sample Lesson. No cost—no obligation. Use the coupon now—we'll answer by return airmail.

**APPROVED FOR  
VETERANS  
AND  
NON-VETERANS**  
Check coupon below

**Both  
Resident and  
Home Study  
Courses Offered!**

## NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA • ESTABLISHED 1905  
IN CANADA: 811 W. HASTINGS STREET, VANCOUVER, B.C.

## FIND OUT NOW—MAIL COUPON TODAY!

**NATIONAL SCHOOLS, Dept. RH-123**  
4000 South Figueroa Street  
Los Angeles 37, California

Send FREE Radio-TV Electronics book and FREE sample lesson. I understand no salesman will call on me.

NAME \_\_\_\_\_ AGE \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

☐ Check here if released from service less than 4 years ago.

☐ Check here if interested in Resident Training at Los Angeles.

Mail in envelope or paste on postal card.



# UHF CONVERTER



MODEL NO. RC-53  
Patent Pending

\$19.95

*Regency*

Div. I. D. E. A., Inc.  
7900 Pendelton Pike  
Indianapolis 26, Indiana  
Telephone: Cherry 2466

Six months from today

Which Will  
You Hold?

this-

or this

REGRET TO ADVISE  
YOU FAILED YOUR  
FCC EXAMINATIONS-

1<sup>ST</sup> CLASS  
RADIO TELEPHONE  
OPERATOR'S LICENSE

Add Technical Training  
To Your Practical Experience-  
**GET YOUR FCC LICENSE  
IN A HURRY!**

Then use our Amazingly Effective  
JOB-FINDING SERVICE

Money-Making  
FCC  
Commercial  
Radio Operator  
LICENSE  
Information

Get This  
Valuable Booklet  
**FREE!**

TV ENGINEERING  
INCLUDED IN OUR  
TRAINING & COACHING

● TELLS HOW-

Here Is Your  
GUARANTEE

If you fail to pass your  
Commercial License exam  
after completing our  
course, we guarantee to  
continue your training  
without additional cost of  
and kind until you suc-  
cessfully obtain your  
Commercial license, pro-  
vided you first sit for this  
examination within 90  
days after completing  
your course.

**We Guarantee**  
TO TRAIN AND COACH YOU  
AT HOME IN  
SPARE TIME UNTIL YOU GET

**Your FCC License**

If you have had any practical expe-  
rience—Amateur, Army, Navy, radio  
repair, or experimenting.

● TELLS HOW-

**Employers make JOB OFFERS Like These  
to Our Graduates Every Month**

Letter from nationally-known Airlines, "We would also appreciate if you would place  
the following additional advertisement in your bulletin-Wanted-Superintendent of  
Communications . . . Salary \$600.00 per month."

Letter from nationally-known airplane manufacturer, "We need men with electronic  
training or experience in radar maintenance to perform operational check-out of radar  
and other electronics systems . . . starting salary . . . amounting to \$329.33 per month."

These are just a few samples of the job offers that come to our office periodically. Some  
licensed radioman filled each of these jobs . . . it might have been you!

**HERE'S PROOF FCC LICENSES ARE OFTEN  
SECURED IN A FEW HOURS OF STUDY with  
OUR Coaching AT HOME in Spare Time.**

Name and Address	License	Lessons
Lee Worthy 22104 Wilshire St., Bakersfield, California	2nd Phone	18
Clifford E. Vogt Box 1016, Dania, Florida	1st Phone	20
Francis K. Forch 18 Hunter Pl., Bensenville, New Jersey	1st Phone	38
Sgt. Ben H. Davis 517 North Roosevelt, Leominster, Illinois	1st Phone	38
Albert Schmitt 110 West 11th St., Escondido, California	2nd Phone	23

Carl E. Smith, E.E., Consulting Engineer, President  
**CLEVELAND INSTITUTE OF RADIO ELECTRONICS**  
Desk RN-59, 4900 Euclid Bldg., Cleveland 3, Ohio

● TELLS HOW-

**Our Amazingly Effective  
JOB-FINDING SERVICE  
Helps CIRE Students Get Better Jobs**

Here are a few recent examples of Job-Finding results:

**GETS CIVIL SERVICE JOB**

"Thanks to your course I obtained my 2nd phone license, and am now employed by Civil  
Service at Great Lakes Naval Training Station as an Engineering Specialist."

**GETS STATE POLICE JOB**

"I have obtained my 1st class ticket (thanks to your school) and since receiving same I  
have held good jobs at all times. I am now Chief Radio Operator with the Kentucky  
State Police."

Edwin P. Healy, 204 E. 3rd St., London, Ky.

**GETS BROADCAST JOB**

"I wish to thank your Job-Finding Service for the help in securing for me the position  
of transmitter operator here at WCAE, in Pittsburgh."

Walter Konechik, 1442 Ridge Ave., N. Braddock, Pa.

**GETS AIRLINES JOB**

"Due to your Job-Finding Service, I have been getting many  
offers from all over the country, and I have taken a job with  
Capital Airlines in Chicago, as a Radio Mechanic."

Harry Clare, 4537 S. Drexel Blvd., Chicago, Ill.

Your FCC Ticket is recognized in all radio  
fields as proof of your technical ability

OURS IS THE ONLY  
HOME STUDY  
COURSE WHICH  
SUPPLIES FCC-  
TYPE EXAMINA-  
TIONS WITH ALL  
LESSONS AND  
FINAL TESTS.

**Get All 3 Free**

**MAIL COUPON NOW**

CLEVELAND INSTITUTE OF RADIO ELECTRONICS  
Desk RN-59—4900 Euclid Bldg., Cleveland 3, Ohio  
(Address to Desk No. to avoid delay)

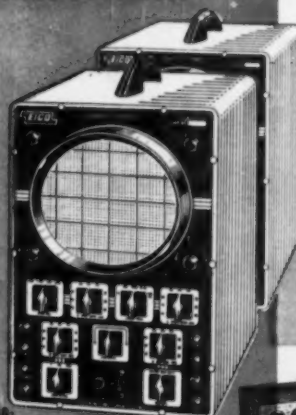
I want to know how I can get my FCC ticket in a minimum of time.  
Send me your FREE booklet, "How to Pass FCC License Examinations"  
(does not cover exams for Amateur License), as well as a  
sample FCC-type exam and the valuable booklet, "Money-Making FCC  
License Information." Be sure to tell me about your Television  
Engineering Course.

NAME.....  
ADDRESS.....  
CITY..... ZONE..... STATE.....  
Paste on two-cent postcard or send airmail

# New! 7 INCH PUSH-PULL OSCILLOSCOPE

Only **EICO** Has All These Features:

- VERTICAL FREQ. RESPONSE: Flat  $\pm 2$  db 10 cps — 1 mc
- VERTICAL SENS.: .01 volts rms/inch
- HOR. FREQ. RESP.: Flat  $\pm 0$  db 10 cps — 200 kc, -4 db at 500 kc
- HOR. SENS.: .3 volts rms/inch
- SWEEP RANGE: 15 cps-100 mc
- 3-STEP PER-COMPENSATED ATTENUATOR eliminates freq. distortion, overloading.
- CATHODE FOLLOWER inputs to both amplifiers
- PUSH-PULL outputs in both amplifiers
- RETURN TRACE BLANKING
- INT. VOLTAGE CALIBRATOR
- V & H TRACE EXPANSION & CENTERING: 1.5X full screen without distortion.
- DIRECT CONNECTION to vert. CRT plates. KIT \$79.95. WIRED \$129.50.
- PHASING CONTROL of internal 60 cps sine wave sweep. \$129.50.
- AT FRONT PANEL: Intensity mod. input; 60 cps, sawtooth outputs.



MODEL 470K

Famous **EICO** amazing feature-packed economy-priced 7 1/2" PUSH-PULL SCOPE KIT \$44.95. WIRED \$75.95.

- AC & DC volts: 0-5, 10, 100, 500, 1000 V (30 KV with HVP-1 probe). • 5 ohm ranges from .2 ohm to 1000 meg.
- DC input Z 26 meg.
- 4 1/2" meter movement in can't-burn-out circuit.
- 1% mult. resistors.



221K VTVM KIT \$25.95. WIRED \$49.95.

- HIGH VOLTAGE PROBE \$6.95
- Extends range of VTVMs & voltmeters to 30 KV.



- PIX TUBE ADAPTER for Tube Testers \$4.90. Checks TV picture tubes while in set.

- Continuous coverage of all TV & FM freqs. from 500 kc to 228 mc.
- Sweep width variable 0-30 mc.
- Crystal marker oscillator, variable amplitude.



360K SWEEP GEN. KIT \$34.95. WIRED \$49.95.



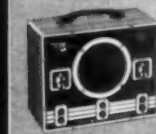
214K VTVM KIT \$34.95. WIRED \$54.95.

- Large 7 1/2" meter, can't-burn-out circuit.
- AC/DC volts: 0-5, 10, 100, 500, 1000 (30 KV with HV Probe).
- 5 ohms ranges from .2 ohm to 1000 meg.
- DC input Z 26 meg.
- 1% mult. resistors.



950A-K R-C BRIDGE & R-C-L COMP. KIT \$19.95. WIRED \$29.95.

- Measures & tests all resistors; 5 ohm to 500 megohms.
- Every type condenser, 10 mfd to 5000 mfd.
- 0-500 DC voltage source for capacitor leakage testing.



145K SIG. TRACER KIT \$19.95. WIRED \$29.95.

- Audibly signal traces all IF, RF, Video & Audio circuits from ANT to SPKR or CRT in all TV, FM, AM, etc. without switching.
- Germanium crystal diode probe responsive to over 200 mc.
- Integral test speaker.



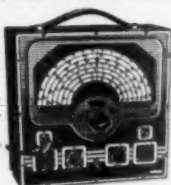
320K SIG. GEN. KIT \$19.95. WIRED \$29.95.

- Fundamentals 150 kc to 34 mc, harmonics to 102 mc.
- 5-step band switching.
- Colpitts audio oscillator generates 400 cps pure sine wave voltage.
- Permits pure RF, modulated RF, or pure AF.



1171K RES. DECADE BOX KIT \$19.95. WIRED \$24.95.

- Resistance values from 0 to 99,999 ohms with 0.5% precision.
- All resistors have 0.5% accuracy.



- Covers range of 75 kc to 150 mc.
- 7 calibrated scales; accuracy better than 1%.
- Bandspeed vernier tuning.
- 4-step RF shielded output multiplier; constant output Z.

315K DELUXE SIG. GEN. KIT \$39.95. WIRED \$59.95.



- 1000  $\Omega$ /V; 31 ranges
- DC/AC volts: Zero to 1, 5, 10, 50, 100, 500, 5000.
- DC/AC Current: 0-1, 10 ma; 0-1, 1 A.
- Ohms: 0-500, 100 K, 1 meg.

330K MULTIMETER KIT \$12.90. WIRED \$14.90.



- Complete sine wave coverage, 20-200,000 cps in 4 direct-reading ranges.
- Complete square wave coverage, 60-50,000 cps.
- Cathode follower output circuit.

326K MULTIMETER KIT \$13.90. WIRED \$16.90.



- 20,000  $\Omega$ /V; 31 ranges.
- DC/AC/Output volts: 0-2.5, 10, 50, 250, 1000, 5000.
- DC Current: 0-100  $\mu$ a; 10, 100, 500 ma; 10 A.
- Ohms: 0-2K, 200K, 20 meg.

377K SINE & SQUARE WAVE AUDIO GEN. KIT \$31.95. WIRED \$49.95.

565K MULTIMETER KIT \$24.95. WIRED \$29.95.

555K MULTIMETER KIT \$29.95. WIRED \$34.95.

1% precision resistors

\* at less than our cost of handling (see the EICO Guarantee Card enclosed with each kit and instrument).



## NEW!

- SCOPE VOLTAGE CALIBRATOR KIT 493K KIT \$12.95. WIRED \$17.95.
- Sq. wave output at power-line freq. with full-scale readings of .1, 1, 10 or 100 V. peak-to-peak.
- Accuracy  $\pm$  .5% of full-scale on each range.

## NEW!

6V & 12V BATTERY ELIMINATOR KIT 1000K KIT \$29.95. WIRED \$39.95.

- DC output: 0-8 V or 0-16 V.
- Continuous current rating: 10 A at 8 V, 5 A at 12 V.
- Intermittent current rating: 20 A at 8 V, 12 A at 12 V.
- Sensitive Voltmeter & Ammeter.



## NEW!

- DECADE CONDENSER BOX KIT 1100K KIT \$14.95. WIRED \$19.95.
- All capacitors precision silver mica, accuracy  $\pm$  1%.
- Range from 100 mfd — 0.111 mfd in steps of 100 mfd.
- Smooth-action positive detent ceramic switches.

Prices 9% higher on West Coast. Specifications and prices subject to change without notice.

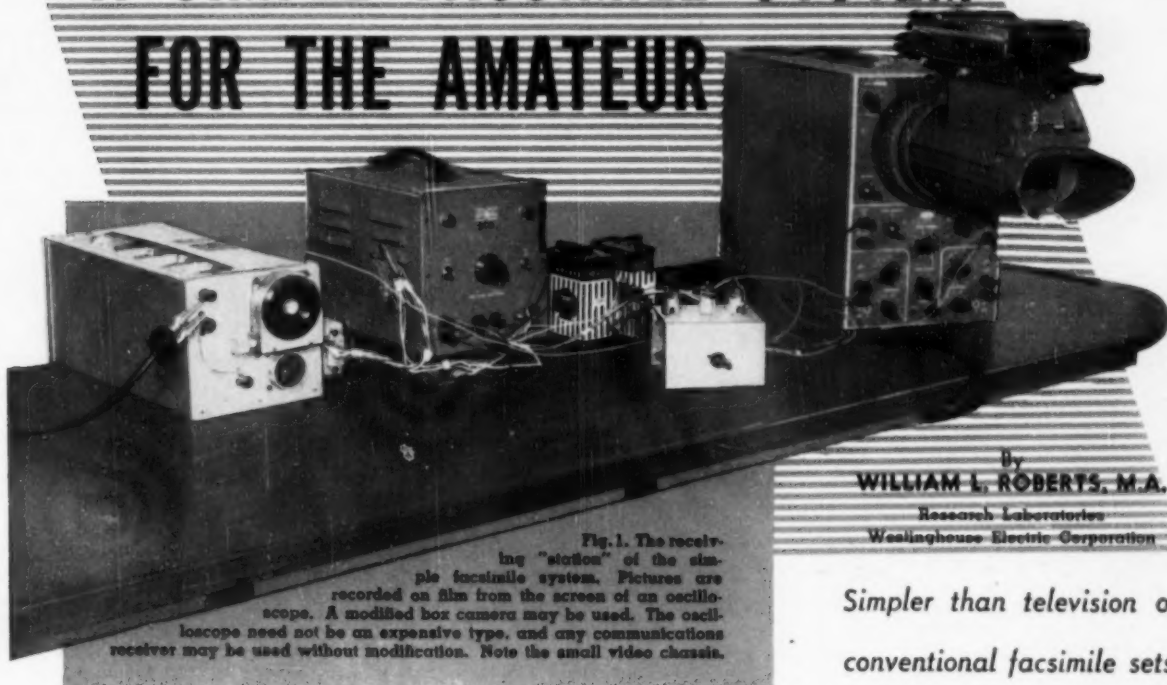


Write NOW for FREE latest Catalog R-12

You build EICO Kits in one evening, but... they last a lifetime! And you SAVE OVER 50%! See the famous EICO line TODAY, in stock at your local jobber.

ELECTRONIC INSTRUMENT CO., Inc., 84 Withers Street, Brooklyn 11, N. Y.

# A SIMPLE FACSIMILE SYSTEM FOR THE AMATEUR



By  
**WILLIAM L. ROBERTS, M.A.**  
Research Laboratories  
Westinghouse Electric Corporation

Fig. 1. The receiving "station" of the simple facsimile system. Pictures are recorded on film from the screen of an oscilloscope. A modified box camera may be used. The oscilloscope need not be an expensive type, and any communications receiver may be used without modification. Note the small video chassis.

*Simpler than television or conventional facsimile sets, this interesting project is within an amateur's budget.*

**A**LTHOUGH a certain number of radio amateurs, both in this country and abroad, are engaged in developing small television transmitters, such activities are beyond the scope, both financially and technically, of the average amateur. Moreover, the radiation of conventional video signals, designated as a type A5 transmission, is restricted to the amateur bands above 420 mc. because of the large bandwidth required. Unfortunately, communication on these bands is usually limited to distances less than the optical horizon visible from the transmitter and thus may be only on the order of 50 to 100 miles.

A simple, inexpensive facsimile system for the transmission of photographs could readily become popular and would make radio contacts a much more personal experience. Such transmissions, giving the same definition as a television picture and requiring a bandwidth no wider than that used for telephony, could be made on amateur bands where facsimile or A4 transmissions are permitted. Thus, still pictures could be transmitted on all amateur bands above 26.960 mc. with the exception of the 10-meter band (28.0-29.7 mc.). In the 11-meter band communication distances of thousands of miles are possible with modest equipment.

This article describes an experimental method for the relatively slow transmission of photographs utilizing a video bandwidth of approximately 5 kilocycles. Both the transmitting

and receiving equipment are simple in design and within the financial reach of most amateurs, since the two major items required are: (a) an oscilloscope, and; (b) a camera.

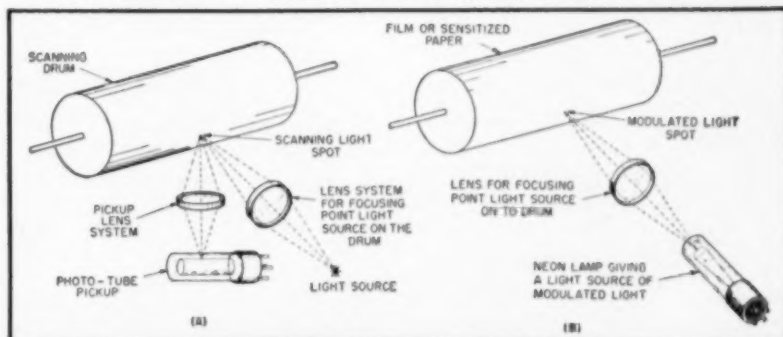
In transmitting a picture the system utilizes an ordinary oscilloscope as a flying-spot scanner and a photo-multiplier as a video pickup unit. To receive the picture, the oscilloscope is used to slowly reproduce the photograph line by line while the face of the tube is being photographed. A "Polaroid Land" camera may be used where rapid processing of the film may be desired, but a much cheaper and simpler camera may be modified for the purpose.

## Conventional Methods

Facsimile transmission and recep-

EDITOR'S NOTE: Type A4 facsimile (amplitude modulated) is permitted in all the amateur v.h.f. and u.h.f. bands including six meters, and also in the 11-meter band (26.960-27.230 mc.). There are at present very few specific rules governing amateur facsimile. However, the signal bandwidth should be no greater than that of a correctly-operated phone transmitter and the general rules on purity of emission apply. The station call sign must be transmitted at least once every ten minutes as required by the general regulations, both in facsimile and in c.w. or phone on the same frequency used for the facsimile transmissions. This system will meet the requirements and may be applied to any good-quality transmitter in the appropriate frequency range.

Fig. 2. Essentials of conventional mechanical scanning and reproducing systems.



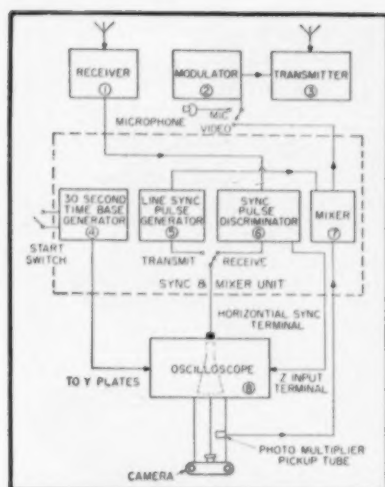


Fig. 3. Block diagram of the simple amateur facsimile system. Units 1, 2, and 3 at the top are part of any amateur phone station. The units of the sync and mixer system are fairly simple to build. Even inexpensive scopes should be satisfactory.

tion is normally accomplished by means of electromechanical devices. The photograph or material to be transmitted is wrapped around a drum capable of rotation and the scanning head consists of an optical system which focuses a small spot of light on the picture as shown in Fig. 2A. As the drum rotates, the spot of light is made to travel at a much slower rate from one end of the drum to the other. Light reflected from the subject of the picture is detected by the phototube as shown.

Similar equipment is used for recording the facsimile transmissions and four methods are currently in use, namely; photographic, wet electrolytic, dry electrolytic, and carbon paper processes.

Fig. 2B shows a sketch of the equipment for the photographic process and here it will be seen that an amplitude-modulated point source of light is made to scan a raster on a film on sensitized paper wrapped around a rotating drum. Synchronization of the transmitting and recording units is often accomplished by using driving

motors which are initially brought into accurate phase relationship with each other by means of a phasing signal before the picture is transmitted. Thereafter, during the transmission of the picture, reliance is placed upon the constant speed motors to maintain their phase relationship. Other facsimile systems automatically start the recording drum at the beginning of each line scan.

In commercial facsimile practice both AM and FM systems are used. In the case of amplitude modulation, however, the signal frequency is used to first modulate an audio frequency and this, in turn, is used to modulate the transmitter.

### Regulations

Because facsimile transmissions are normally made by the methods described previously, the rules and regulations laid down by the FCC relating to such transmissions are, strictly speaking, only applicable to these methods. The necessary bandwidth for facsimile transmissions is given in these rules and regulations as:

$$(KN/T + 2M) \text{ cps}$$

where:

$K$  is an over-all numerical factor which differs according to the emission and depends upon the allowable signal distortion. This factor is set at 1.5.

$N/T$  is the maximum possible number of black plus white elements to be transmitted per second, and

$M$  is the maximum modulation frequency expressed in cycles-per-second.

The total number of picture elements (black and white) transmitted per second is given by the product of the following factors: (a) the circumference of the drum; (b) number of scanning lines made per unit length along the drum; and (c) the speed of rotation of the cylinder in revolutions-per-second.

The system to be described does not use mechanical scanning or recording units. Hence, these rules are not strictly applicable. However, the system fulfills the legal requirements for amateur facsimile as they stand, in regard to bandwidth, etc.

The first tests were made in the laboratory with "closed-circuit" models,

which did not radiate a signal on the air. The test results were gratifying (see Fig. 10) and indicated that the system would be useful in actual communication.

The laboratory "station" used a modulated low-power oscillator coupled by r.f. cable to a receiver to simulate actual transmission. The transmitting equipment may be used with any good, stable transmitter in one of the frequency ranges in which A4 facsimile is permitted. When collaborators are found tests will be made over communications distances.

### Bandwidth and Speed

If the bandwidth of a facsimile system is arbitrarily fixed at some reasonable value such as 5 kc., then to obtain pictures with the same resolution as a television image (which is reproduced with a 4 mc. bandwidth in a time of 1/30th of a second), the total time for the transmission of a photograph would be approximately half a minute.

However, with sacrifice of resolution, the time of transmission may be reduced. Similarly, if a wider bandwidth is to be employed, as is permissible on the higher frequency bands, then the speed of transmission may also be increased.

In view of the fact that no standards exist for this type of facsimile transmission, the equipment described utilizes a bandwidth of 5 kc. and was designed to give a picture with about the same definition as a television picture.

### Basic Equipment

Every amateur telephone station possesses a receiver (1), a modulator (2), and a transmitter (3) as shown in Fig. 3. To convert this into a facsimile transmitting station only a "sync and mixer unit" and an oscilloscope (together with photomultiplier and camera) need be added.

Examination of Fig. 3 shows that the "sync and mixer unit" consists of four sub units (or stages), namely: a 30-second time-base generator (4); a line sync-pulse generator (5); a sync-pulse discriminator (6), and a mixer (7).

Each of these stages, depending on

Fig. 4. Block diagram of the author's experimental facsimile transmitting system. The r.f. oscillator feeds the receiver directly, through coaxial cable. On-the-air tests have been deferred pending clarification of standards for this system.

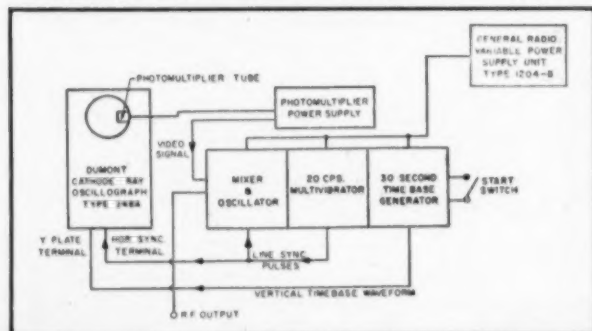
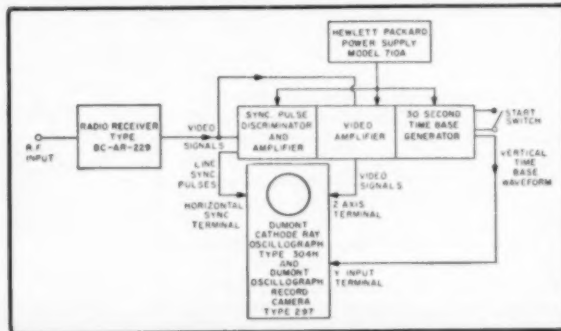


Fig. 5. Block diagram of the receiving system. The receiver, oscilloscope, and power supply were what happened to be available; other, less expensive units may be substituted. Cheap box cameras, suitably modified, may be used for recording.



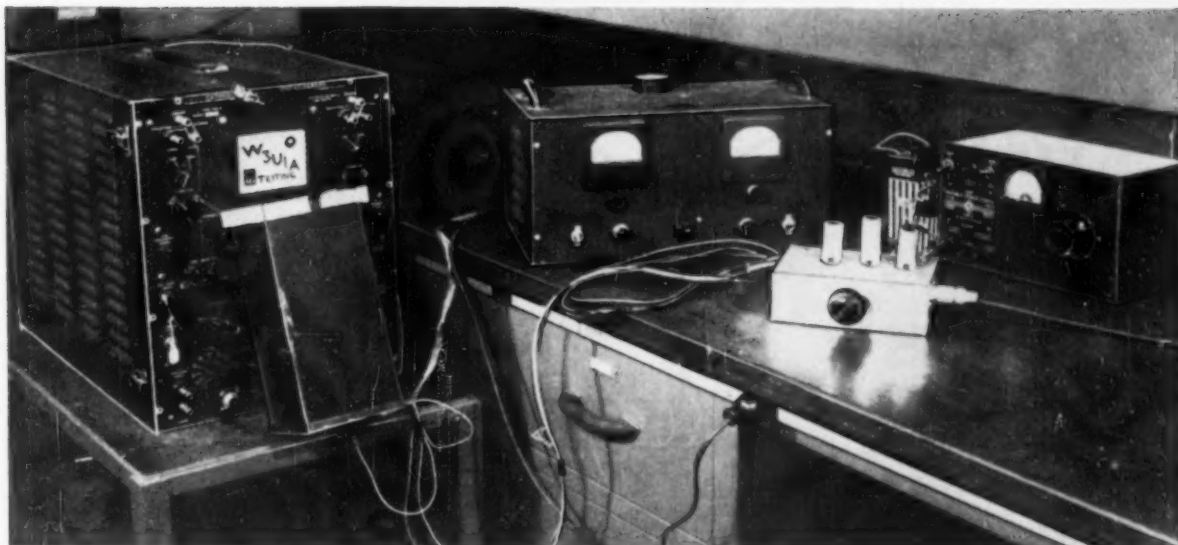


Fig. 6. The transmitting "station," consisting of oscilloscope flying-spot scanner, photomultiplier pickup tube and associated circuits (see Fig. 9), transmitter and power supply. The little transmitter chassis also houses the 30-second time-base generator and 20-cps multivibrator. Commercially-built power supply at right may be replaced by any good 250-volt d.c. supply.

its design, takes one (or possibly two) tubes. Hence, it is not a formidable unit to build, although it should be constructed so as to accommodate the high voltage supply for the photomultiplier.

The 30-second time-base generator (4) may be a conventional Miller-type circuit utilizing a pentode with a condenser strapped between its plate and grid. Shorting the "start" switch causes the plate voltage to fall linearly until "bottoming" occurs.

The sync-pulse generator (5) used only during transmission is a simple multivibrator operating at 15 or 20 cps and capable of easy synchronization to the 60-cps line frequency. Its function is twofold: to provide synchronizing pulses to the oscilloscope when it is used as a flying-spot scanner and to the mixer where they are mixed with the video signal for transmission.

The sync-pulse discriminator (6), used only during reception, is similar in design to that used in a conventional TV set. Its purpose is to separate the sync pulses from the video signals and to pass them on to the oscilloscope for synchronization.

The purpose of the mixer (7) is apparent from Fig. 3 and during transmission, mixes the video and line sync pulses for application to the modulator (2).

The oscilloscope (8) may be any available instrument, but it should have the following features: (a) a cathode-ray tube with short-persistence phosphor; (b) a Z input terminal with d.c. restoration; and (c) a linear time base capable of good and steady synchronization at low speeds, (d) a d.c. connection to one of the Y plates; and, (e) good uniform brightness and focusing across the face of the tube.

The short-persistence phosphor on the face of the cathode-ray tube is re-

quired only when the oscilloscope is used as a flying-spot scanner. That used by the author was a P11 phosphor, but a P4 or a P5 should be equally suitable. (Certain tubes with P4 phosphors such as the 5BP4 and 5HP4 are available for about \$5.00 on the surplus market.)

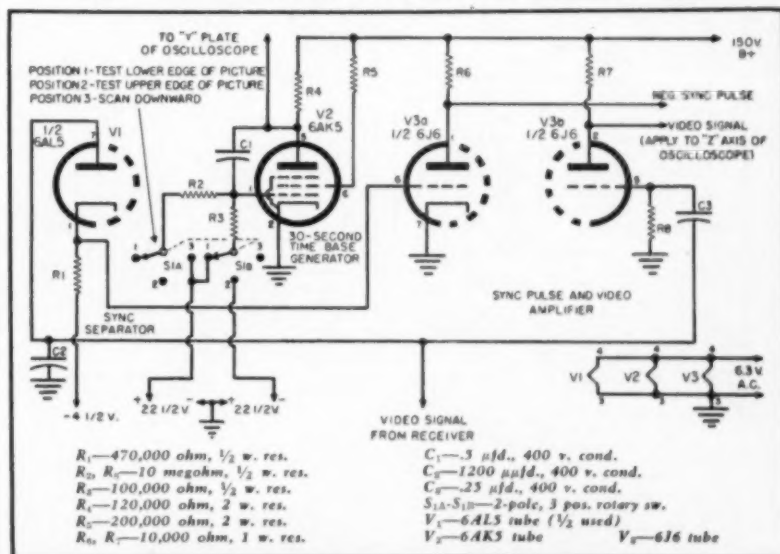
Most oscilloscopes are provided with a Z input terminal but in any event, an oscilloscope may be readily modified to give this provision by connecting a terminal via a large condenser to the grid (or cathode). The d.c. restoration should be provided by wiring a crystal diode (such as a 1N34) across the grid leak in such a manner that the grid cannot go negative with respect to the potential of the other end of the grid leak.

Although most oscilloscopes contain horizontal time bases capable of running at 15 or 20 cps which are easily synchronized, an external one could readily be built to meet this requirement. Because of the very low scanning rate of the vertical time base, a d.c. connection to one of the Y plates is desirable. If this is not provided on the oscilloscope, a direct connection can readily be made to one of the Y plates.

It is gratifying to find that as the video signal is applied to either the cathode or grid, the frequency response of the Y amplifiers is unimportant. Hence, cheap oscilloscopes are entirely suitable for the purpose.

In his experiments, the author used a Du Mont-modified "Polaroid Land"

Fig. 7. Schematic of the receiver video unit, for use with ordinary receiver.



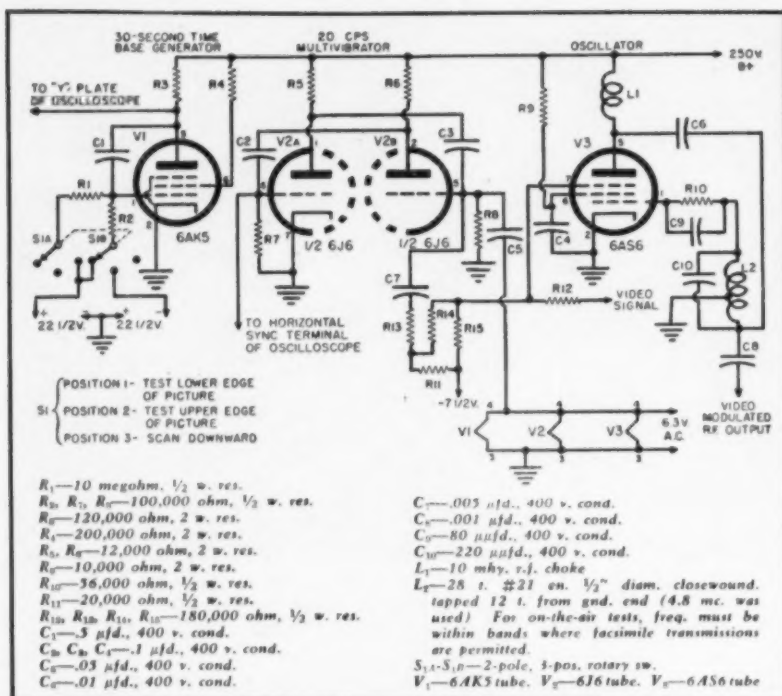
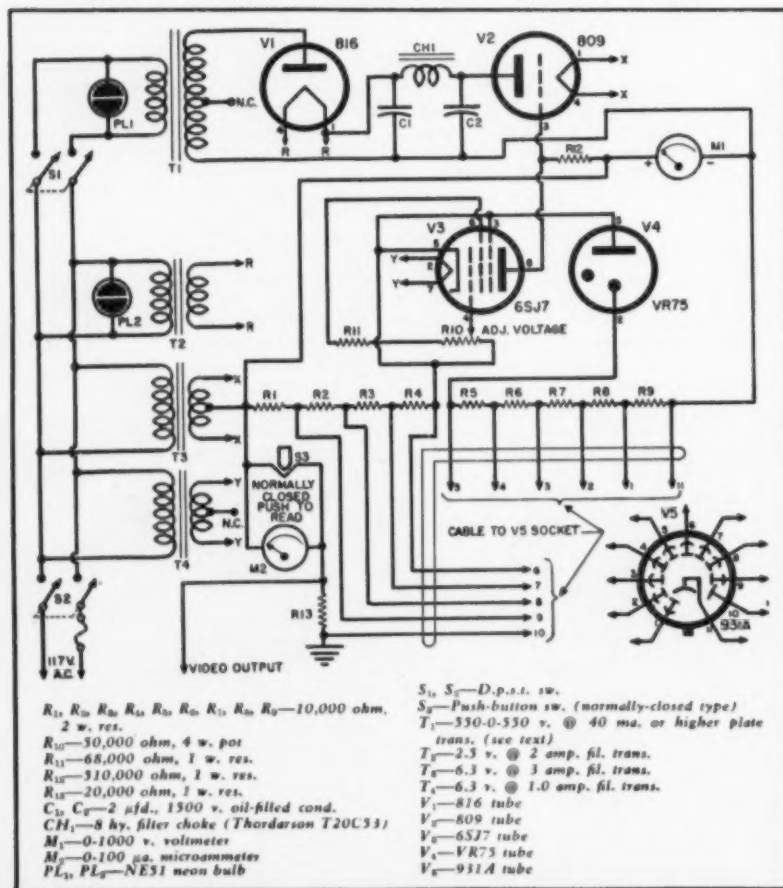


Fig. 8. Schematic of the transmitter synchronization, mixer, and r.f. systems.

Fig. 9. Circuit of the photomultiplier pickup and associated power supply.



camera to record the transmissions because this instrument was readily available. However, it is planned to modify cheap box cameras so as to be suitable for recording purposes.

It is also interesting to note that if visual presentation of the video signals is not immediately desirable, they may be recorded on tape to be applied to the oscilloscope later. However, the recorder must have a good frequency response and must not introduce phase shifts.

### Experimental Stations

To test the system, two stations were simulated in the laboratory, a transmitting and a receiving station as shown in Fig. 1 and Fig. 6. The former station utilized an oscilloscope as a flying-spot scanner, a photomultiplier pickup unit, a 30-second time base generator, a 20 cps sync-pulse generator, a mixer circuit and an r.f. oscillator shown schematically in Fig. 8. The latter station, illustrated diagrammatically in Fig. 5 and coupled to the former by r.f. transmission line, consisted of a receiver, a sync-pulse separator, a 30-second time-base generator, and an oscilloscope with recording camera. Copy was transmitted only in one direction because by so doing not only was the necessity of duplicating certain parts of the equipment eliminated, but because a one-way transmission was sufficient to demonstrate the process.

Because of his desire to test the performance of the system without undue delays, the author utilized whatever equipment happened to be on hand in a well-furnished laboratory. As a consequence expensive equipment was used where inexpensive components would have been just as usable.

### Transmitter

For the flying-spot scanner, a Du Mont cathode-ray oscillograph type 248A was used with a photomultiplier mounted in a brass box attached by hinges to the front face of the oscilloscope. Copy to be transmitted was applied directly to the face of the tube in the form of negatives or written on the tube face with china marking pencils.

The oscilloscope utilized a 5RP11 tube and the time base was as linear as could be desired. However, the trace was not of uniform brightness and tended to be dim at the beginning and end of the sweep. Because the oscilloscope normally utilized capacitive coupling to the Y plates, a d.c. connection was made directly to one of the Y plates in the 5RP11 tube.

The photomultiplier power supply shown schematically in Fig. 9 was designed for another purpose and it was used without modification except for the insertion of a load resistor of about 20,000 ohms in series with the last dynode. Under normal operating conditions, an average d.c. current of

(Continued on page 128)

# TV SERVICING IN THE HOME

By  
**RICHARD BLITZER**

*Discussion of the advantages of TV servicing in the home using new completely portable test instruments.*

**V**ERY often on a service call in a customer's home, the radio-TV technician finds himself wishing he could fix the set without having to carry the heavy chassis down several long flights of stairs. When the trouble isn't simply a tube, the usual procedure is to "pull the chassis" and carry it back to the lab.

The author, himself a TV service technician, has asked many other experienced technicians for their opinions on home servicing. Some said it would be inadvisable; others said they do as much servicing as they possibly can in the customer's home.

In the main, the objections seem to boil down to the following:

1. Lack of working space and test equipment in the customer's home.
2. Necessity for carrying many stock parts.
3. The nuisance of having the customer (or his offspring) looking over your shoulder, asking questions, and even getting in the way.
4. The possibility of damaging household furnishings.
5. The difficulty of convincing the customer, who saw you repair the set, of the validity of your bill (especially when it is large).
6. The higher operating costs resulting from the need to employ skilled outside service technicians who know as much as benchmen, and command higher salaries than the simple "tube changing" service mechanic.

As to the first objection, most homes have a kitchen or dining room table large enough for service work. Also, compact, portable test equipment, which the technician can easily take along on all service calls, is now available, and more and more test equipment manufacturers are designing multiple functions into their individual test instruments. The carrying

case in the left hand of the technician in Fig. 1, for example, contains every piece of test equipment that a service technician could need in the home. Such a test equipment set might include a tube tester (for both ordinary and cathode-ray tubes), a v.t.v.m. with high-voltage probe, AM and FM signal generators, and even a scope, and still not weigh more than 30 lbs.

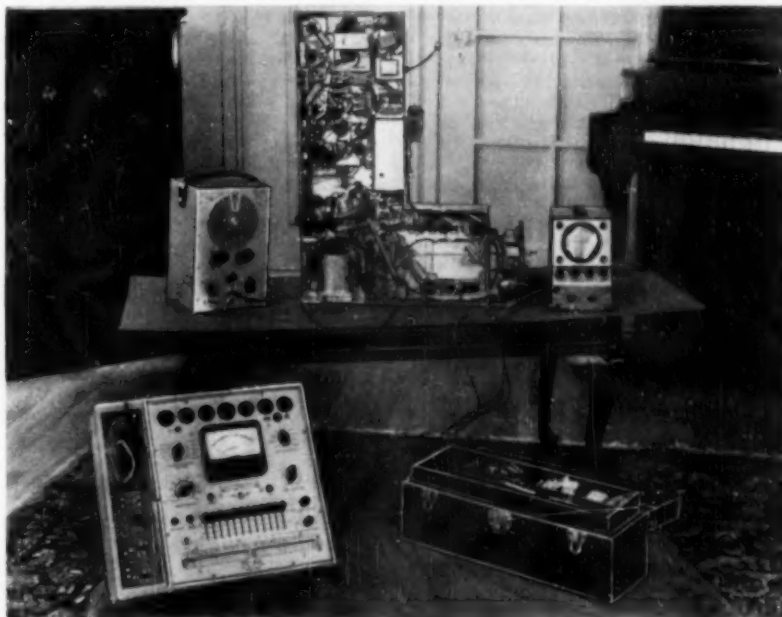
Where it is apparent that the service technician will not have table space, he should not attempt to work on the floor in cramped quarters, and should remove the set to the shop.

As to the parts problem, a small supply of resistors, condensers, universally-used output transformers, and tubes, should be stocked in the truck  
(Continued on page 126)



Fig. 1. TV technician on a service call carries an RCP portable test set and a tube caddy.

Fig. 2. A typical service-in-the-home setup using Radio City Products instruments.



# PAGES FROM A TAPE EDITOR'S NOTEBOOK

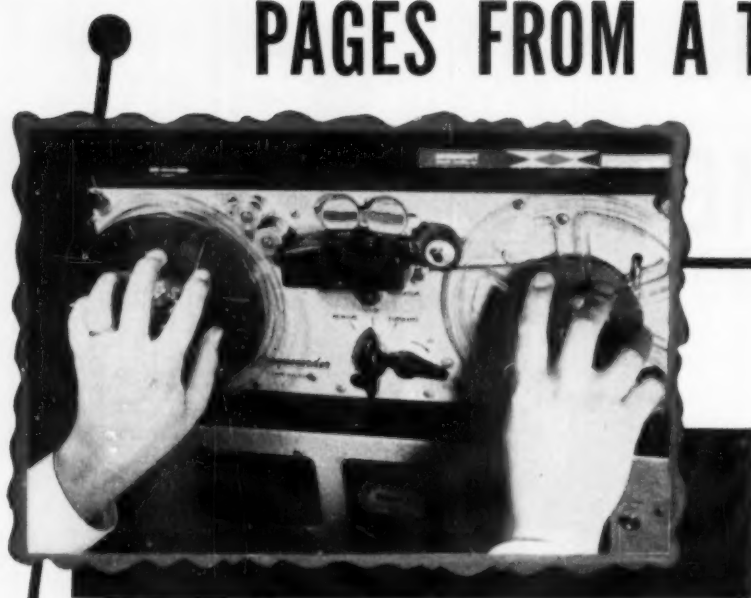


Fig. 1. A given point on the tape is "spotted" by rapidly moving the tape back and forth past the playback head by hand.

By

DONALD C. HOEFLE

heard. The tape is then reversed until sound just dies out, it is cut at the end of the shield housing nearest the takeup reel and spliced to the blank tape previously prepared.

There arises a somewhat more complex problem, however, when it is necessary to assemble a complete program from its composite parts without the leeway of long pauses between segments. A dramatic show, for example, which was recorded one scene at a time—or perhaps even line by line—must be joined together so as to provide cohesion and continuity.

The editor normally works with the director on this, and in order that their timing be precise the tape is marked at the exact spot where the following section should begin.

This involves another indispensable editing tool known as a china-marking or grease pencil. It is a standard stationery item, available in various colors. Bright yellow is usually best, as it shows up well against red oxide tape. But it is well to have several colors available to avoid confusion when it is necessary to place more than one mark on a given section of tape.

For precise editing the shield must be removed from the playback head so that the tape may be marked at the moment it passes the head. It is played beginning a little ahead of the point where the *segue* is desired, and the pencil point is held almost touching the tape directly over the gap on the playback head. On the director's cue, the pencil immediately strikes and marks the tape, as shown in Fig. 2, and the cut is made at the beginning of the mark. The following part is then pulled manually past the head until the beginning of the desired sound is heard, and rocked back and forth until the exact point is located. A mark is placed on the tape over the gap, as shown in Fig. 3, and a splice marked and cut. Finally the splice is auditioned to verify the result.

Until a splice is approved, it is made there to the end previously good practice to save the tape which was removed. Then if for any reason the splice must be lengthened, some

## Part 2. Methods of splicing recorded tape to provide a free-flowing performance. Actual techniques are covered.

THE advantages of tape recording are well known, its most outstanding being its adaptability for editing. Before any serious editing work is attempted, one must consider the speed of the tape being used. The general rule is *the faster the better*. One can readily see that one second of sound over thirty inches of tape is easier to handle than the same sound crammed into as little as 1½ inches.

When 1/64 inch of 30-ips tape makes the difference between a good and bad splice—a fairly common condition in musical editing—the corresponding tolerance of 1/256 inch at 7½ ips is a near impossibility. It is often desirable, therefore, to make a 30- or 15-ips dub from a slower tape, expressly for editing, and at same time protecting the original from damage. This is also recommended for dual-track tape, for anything removed from the side being edited will result in a gap in the opposite track. Thus neither side of a dual-track tape can be edited directly, unless the companion track is expendable.

A simple editing job as a starter might require splicing together into long-play form a series of tape copies of single phonograph records. Following commercial practice, there should be a five-second pause of silent tape between selections. But as the tape stands after recording, the spaces between parts are much longer and marred by switching clicks. The problem then simply is to silence the pauses and shorten their length.

The first step involves playing the tape toward the end of the first selection, and starting a stop-watch after the music has faded out. Then follows careful listening for noises during the five seconds. If any are heard, they must, of course, be removed. This is done by pulling the tape backwards, turning the supply reel manually. When the noise is heard, the tape is stopped immediately. Then the tape is moved back and forth past the playback head until a point is found where the noise is heard whenever the tape is moved slightly in either direction. This procedure is known as "spotting", and is illustrated in Fig. 1. With the tape in this position, it is cut at each end of the housing which shields the heads, the short length removed, and the two ends spliced together. The process is repeated as often as necessary until five seconds of quiet tape is achieved. All this can be avoided, of course, by the insertion of tape known to be silent, such as erased magnetic tape or plain leader tape. In this case, the quiet tape is simply spliced to the recorded tape where the music ends. The length of silent tape is calculated as five times the operating speed of the machine. (For example: 5 seconds times 7½ ips equal 37½ inches.)

With the blank tape in place, the final step requires splicing at the beginning of the next selection. This is accomplished by pulling the tape from the supply reel past the playback head until the next music is

of the identical tape may be re-inserted, thus preserving the continuity of "room tone."

When breakdowns occur, due either to production difficulty or to equipment failure, the program can still be edited together by the use of the same techniques. It is important, however, when recording is resumed, that the continuity be picked up several lines ahead of the intended splice. For when a speaker begins "cold", he will usually begin with an inflection which will sound unnatural in the middle of a speech. When he is required to backtrack, he will have settled down to his normal pace and inflection by the time he reaches the point of the splice.

It naturally follows then that an editor can do much to put together a well-knit production by cutting out "fluffs" and smoothing the continuity. He may not be able to make a bad production sound good, but he can make a good one sound even better.

Some editors have argued that the frequency response curve of the playback system used for editing should have a marked rise around 4000 cycles, to take advantage of the point of greatest sensitivity of the human ear. But while the editor of radio shows and other material consisting largely of speech may find such a system to be advantageous, it is out of the question when a great deal of music is involved. The music editor may find in one instance that the only convenient place for him to cut his tape is at the beginning of a pizzicato bass note, or again it may be a very high note struck on a triangle. Thus he must have a flat wide-range system which will permit him to find a cue for cutting anywhere throughout the spectrum.

Since a much wider frequency range and greater variety of tonal values are involved in the editing of music, this work is considerably more complex and exacting than the

editing of speech. A situation requiring musical editing occurs in the compositing of parts of a musical work which are incomplete due to breakdowns. Here again it is essential when recording that the artist be required to resume several phrases ahead of the point where the breakdown occurred.

Assume, for example, that an artist makes a mistake at bar 209 of a given composition and the recording is stopped. The next take should begin perhaps around bar 200. The editor will then have on tape an overlap of a half-dozen bars or so which should be identical in tempo, dynamics, and timbre. Somewhere in this area he must find a point at which to cut each of the tapes, remove the excess, join the remaining ends and produce synthetically a continuous musical performance.

If there should happen to be a pause during those few bars, the job is simple and may be accomplished by use of the techniques described for speech. But usually a musical tone must be found which will be used as the cutting cue. A sharp attack by an instrument or section is always easier to spot, and the percussion instruments, harp, piano, oboe, trumpet, French horn, and vocalists usually provide the better cues. The final spotting is done by rocking back and forth, the tape which is removed is preserved temporarily, and the finished splice is auditioned for musical correctness. The first question concerns the content. Were both cuts actually made at the same point—or at two different points which sounded similar? If the latter be true, the composite will have music either missing or duplicated. Next check for tempo and phrasing. Is it identical to that on the original composite parts? Finally check the sound of the splice itself. Does the attack sound natural? If the two cuts were not made at identical points, the resulting

composite may have a double attack—sort of a stuttering effect—on one note; or the attack may have been cut off and the tape cut into the middle of the note. But even with all these precautions, there are occasions when the performances between takes differ to such an extent that a smooth splice is impossible. At this point, the editor must dig deeper into his bag of tricks.

One must re-record and *crossfade* whenever the two tapes to be joined contain a musical overlap but lack any identical points for splicing. This sometimes occurs in the compositing of breakdown parts, but it is encountered most often when a piece of music must be assembled into long-play form from composite parts originally recorded on 78 rpm records. Every side break must then be analyzed, usually with the aid of the musical score, and the treatment necessary to produce the effect of a continuous performance must be devised. Consider the case of a recorded opera where a given side ends with the end of an aria. Suppose that the following side begins with an orchestral passage which, according to the score, should begin at the same time as the last note of the aria is sung. In other words, the first note of the orchestra should begin *simultaneously* with the last note of the aria. It is obvious then that both of these records should, for a brief period, be playing at the same time.

For this job two tape machines (or two turntables, if disc is the source) are required for playback, and a tape recorder is necessary for the master recording. The two playback machines are placed side by side, with one of the recordings on each, and the outputs are fed into a mixer whose output supplies the tape recorder and monitor system. The outgoing part is then played a few times, and a musical cue is established which will be used as the

(Continued on page 126)

Fig. 2. When a succeeding sequence of tape is to be applied to an earlier part, the point at which the splice is to be made is marked on the first tape while it is being played back.

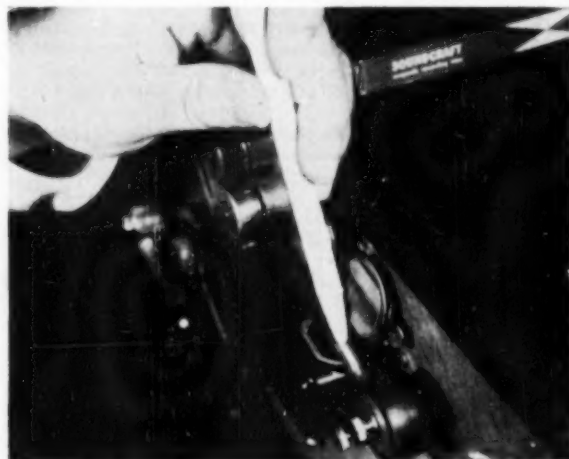


Fig. 3. When a desired sound has been isolated to a given point, a mark is made at that point. Since the sound heard on the tape is directly over the playback head, that is where mark is made.



# THE Compleat FIDELITY THE TV SET

By **DON V. R. DRENNER**

Engineer, Station KGGF

**Part 2. A booster for the Craftsmen TV-200 and a vertical blanking circuit to be added to improve fringe reception. Data on an equalizer for the RC-10 will appear next month.**

**L**AST month the author described the various components which comprised his home installation for high-fidelity reception and gave details on the wall baffle-box which was designed and built to house his *West-ern Electric* 35-watt speaker.

This article covers several modifi-

cations made on the author's *Radio Craftsmen TV-200* television chassis in order to provide primary area reception in what is essentially a fringe area.

Our choice of the *Craftsmen TV-200* for the television end of "The Compleat Fidelity" was dictated by *fide-*

*ty*. We mean to the ear as well as to the eye.

The intercarrier set, while economical, just doesn't have the capabilities of the split-sound type when it comes to audio. Lack of limiting and the "intercarrier buzz" are well known. So we wanted separate i.f.'s for the video and sound, and at least two limiters.

Being in a fringe area we needed a booster, so we made that. It is a 6BQ7 (or a 6BZ7), in a neutralized cascode circuit, patterned after one in "*Sylvania News*" for November 1951.

We could have modified the 200's front end and installed a cascode tuner. But an r.f. amplifier, even a low-noise high-gain one, feeding the mixer directly does not give as good a noise figure as when feeding a pentode 2nd r.f. stage *before* the mixer. So the original r.f. stage became our 2nd. When other channels become available (we receive only Channel 6 now) another booster will be built or a channel switch added. If all this sounds fussy, well we receive usable signals when our neighbors have a screen full of snow!

The cascode circuit shown in Fig. 1 uses neutralizing to improve the noise figure. In construction, isolate the input and output coils, and keep all leads short, particularly the input and output coils.

The coil table (Table 1) should be used as a guide since some variation of a turn or so is to be expected in the grid and plate coils.

A separate power supply is preferred, but the necessary heater and plate voltages may be picked up from the TV set.

## Vertical Blanking

One of the most annoying problems in many TV sets, particularly in fringe area service, is the visible vertical retrace lines. These appear when the brightness control is advanced. Theoretically, the black level is set at the transmitter, and if your d.c. restorer is functioning, or the tube isn't weak, you shouldn't have to touch the brightness control once it is set. In a weak signal area, however, too often average brightness will coincide with prominent retrace lines.

In the *Craftsmen TV-200* used in (Continued on page 146)

CHANNEL	L <sub>1</sub> <sup>a</sup>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub> <sup>a</sup>	L <sub>N</sub>	RFC, RFC <sub>1</sub>
2	3 t.	12 t.	18 t.	18 t.	4 t.	32 t.	12 t.
3	3 t.	10 t.	14 t.	18 t.	4 t.	32 t.	12 t.
4	3 t.	8 t.	14 t.	12 t.	4 t.	32 t.	12 t.
5	3 t.	8 t.	11 t.	12 t.	4 t.	20 t.	12 t.
6	3 t.	8 t.	11 t.	12 t.	4 t.	20 t.	12 t.
7	2 t.	3 1/2-4 t.	8 t.	5 t.	1 t.	11 t.	5 t.
8	2 t.	3 1/2-4 t.	8 t.	5 t.	1 t.	11 t.	5 t.
9	2 t.	3 1/2-4 t.	8 t.	4 t.	1 t.	11 t.	5 t.
10	2 t.	3 1/2-4 t.	8 t.	4 t.	1 t.	10 t.	5 t.
11	2 t.	3 1/2-4 t.	8 t.	4 t.	1 t.	10 t.	5 t.
12	2 t.	3 1/2-4 t.	8 t.	4 t.	1 t.	10 t.	5 t.
13	2 t.	3 1/2-4 t.	8 t.	4 t.	1 t.	10 t.	5 t.

<sup>a</sup>L<sub>1</sub> and L<sub>5</sub> are center-tapped. L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>, L<sub>4</sub>, L<sub>N</sub>—24 en., 1/8" dia. slug-tuned forms; L<sub>N</sub>—24 en., 1/8" dia.; L<sub>5</sub>, RFC<sub>1</sub>, RFC<sub>2</sub>—20 en., 1/8" dia. All coils are close wound.

Table 1. Winding data for the various coils required in the booster circuit. Fig. 1.

Fig. 1. A simple booster circuit which can be added to the Craftsmen TV-200 set.

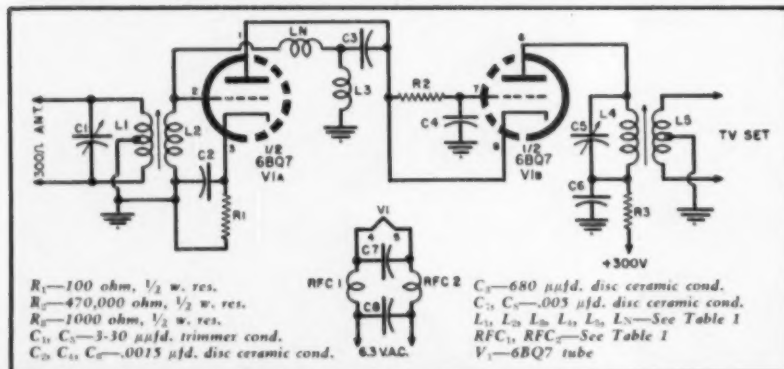
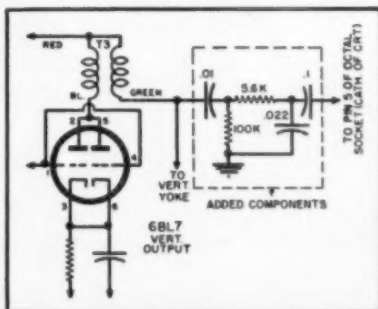


Fig. 2. Circuit for vertical retrace blanking.



# A Dual Channel

## RECORDING SYSTEM

By OLIVER READ \*

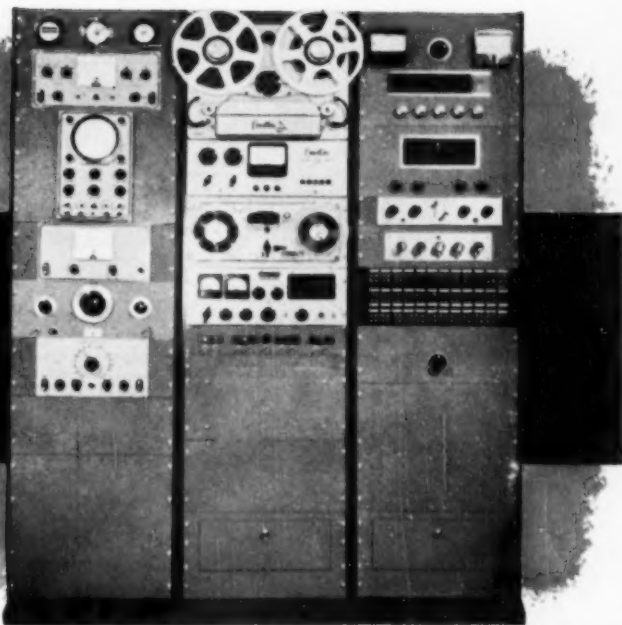


Fig. 1. The relay racks comprising the system are interconnected by means of cables to permit simple relocation of the system at any time, as required.

ONE of the prime requisites of a hum-free audio system is to isolate the various signal circuits, so that there will be no crosstalk between components resulting from audio levels differing by approximately 20 db.

Reference to Fig. 1 shows the mounting of components on the control rack (right side) comprising the following: Fisher and Craftsmen FM-AM tuners, preamp-equalizers, jack panels, line amplifier, monitor amplifier, power amplifier, and the three barrier-type terminal blocks.

A somewhat simplified means for selecting various circuits is employed at the inputs to the system. Each of the preamp-equalizers (Fig. 4) is normally equipped with five separate inputs, any one of which may be selected at the control panel of the preamp by means of a switch. In this system, all of the inputs, such as pickups, microphones, etc., are connected permanently to the preamps, but each of these inputs is so wired within the system that ready access to these circuits is always available by means of patch cords. Note that each tuner, microphone, pickup, and tape channel is connected to the preamplifiers through double (normalised) jacks, so that continuity of signal remains intact under normal conditions (Fig. 2) and when no patch cords are inserted into the jacks. This circuitry employs the "double jack" system. Another, used by CBS and others, uses a single jack and three-way plug, Fig. 3. It should be noted that the diagram (Fig. 4) is in simplified form, and only the signal circuit (hot lead) is indicated. In addition, of course, the system employs a return wire and a separate insulated shield. Following good engineering practice, all shielded pairs are insulated over-all to prevent unintentional grounding of the shields when bunched and laced and mounted within the racks. In practice, these various

shields are grounded only at the input or output of a component. The jack frames (no signal connection) are grounded to the rack at the jack panel, Fig. 5. The entire system is unbalanced, that is, one side of the signal circuit is at ground potential.

The only exception—and strictly up to the user—would be to modify the design for a balanced condition, especially for the bridging bus. It has been found from experience in testing such systems that, for general recording or all-around audio measurement work, it is not essential to employ the balanced system. Because most high-fidelity components are designed strictly for unbalanced connections, it is well to follow that standard in a system such as this.

It is foolish to enter into the construction of a professional system without providing spare jacks to take care of additional circuits when required. These have been provided, anticipating future changes, and will be required from time to time.

All principal signal circuits terminate in the jack field (Fig. 6). Accordingly, any signal is available for test, and each input or output may be "picked up" by means of a patch cord and plug, see Fig. 9. For example, if a dual channel is required from

the two outputs of  $P-E_1$  and  $P-E_2$ , then patch cords would be inserted in the output jacks of the preamps and connected to any two of the four power (or monitor) amplifiers shown in Fig. 4. In this application, the bridging bus and the line amplifier would be bypassed. In normal use, however, the line amplifier and bridging bus remain permanently (normal) in the circuit.

The entire system (for monaural) is designed to be completely operative without the use of any patch cords. Such cords are only intended to alter the permanent connections as they appear (Fig. 4). It will be obvious that many modifications may be made for connecting various components by means of patch cords.

The wiring diagram for the control rack (Fig. 10) is in simplified form and shows only one-half of each signal pair. In all cases, the return wire indicated by dotted lines is incorporated. The jack panel (top) contains all of the jacks terminating at the inputs of the preamplifiers. For test purposes signals may be selected from the lower jacks, or signals may be fed from a test oscillator, etc. into the jacks on the upper row. This is most convenient for re-recording, dubbing, or for miscellaneous test purposes. Substitute phono pickups may be easily patched into the phono channels of the preamps for comparative tests. Because

\* Editor and Assistant Publisher, RADIO & TELEVISION NEWS and RADIO-ELECTRONIC ENGINEERING.

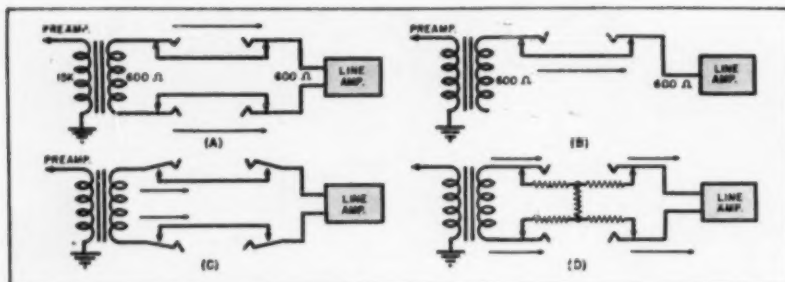


Fig. 2. (A) Typical normalized through circuit. (B) Simplified method used in Fig. 4. (C) Action of jack springs. (D) An alternate loss pad circuit.



Fig. 3. Patch cord and plugs for the CBS single-jack system. See text for details.

these are all low-level circuits, all pairs are bunched separately and isolated from the other circuits of the system. The cable containing these low-level circuits terminates in a barrier strip (Fig. 7) at the bottom panel of the rack. The various components are connected into the system at this point.

The center row contains the line-level and some of the power-level jacks. Most of them are wired permanently to the bridging bus. Reference to Fig. 10 will show a 750-ohm resistor connected to one pair of jacks. This is called the terminating resistor and serves to load the circuit so that the total parallel impedance of all the equipment permanently connected to

the bus will total 600 ohms. It is important, of course, to maintain this impedance inasmuch as the vu meter and its multiplier are calibrated for a source impedance of 600 ohms. Most of the components fed by the bridging bus are of high impedance. In this particular installation, amplifiers 1, 3, and 4 are designed for an input impedance of 100,000 ohms. Amplifier #2 (McIntosh 50W2) is provided with a 20,000-ohm bridging input. The Concertone network tape recorder is also of a high input impedance.

Note that a master gain control is inserted between the line amplifier and the bridging bus. This should be a high-quality broadcast-type control, having a constant resistance of 600 ohms both in and out. In application, it serves to adjust the level at the bridging bus and represents a line level of approximately +4 vu.

The lower jack panel was designed to provide spare jacks and for connecting miscellaneous components such as the matching transformers, hybrid coil, diameter equalizers, etc. These

transformers are mounted on a panel directly below the bottom row of jacks, as seen in Fig. 8. The panel also mounts the line amplifier, which is a modified Pickering 230H preamp. Equalization circuits were removed and a dual 100,000-ohm pot added ahead of the input grid. An output transformer was added to match a 600-ohm line. The dual pot terminates at the outputs of the preamplifiers, as shown in Fig. 4, and serves as a mixer and level set. The outputs of the two preamps employ cathode followers, and are designed to be fed into a load of 100,000 ohms.

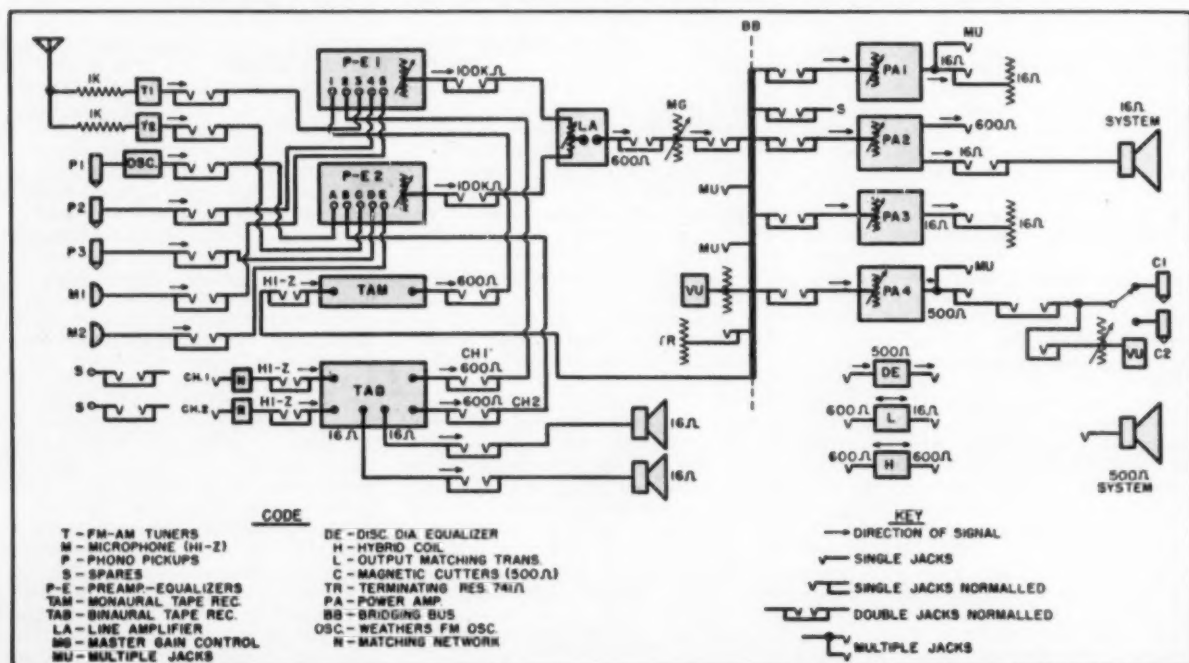
The output of the monaural tape machine (TAM) normally is wired for a balanced output of 600 ohms. This was modified to an unbalanced connection and feeds to P-E<sub>1</sub>.

The outputs of the binaural tape machine (TAB) are also wired for a balanced connection. The machine, however, may be ordered for an unbalanced output which simplifies the connection to P-E<sub>1</sub>.

The inputs of the *Magnecord* are for 50-ohm microphones. These remain as is for field work or for binaural recording for identical 50-ohm microphones. Suitable bridging pads have been installed in this system so that the outputs of P-E<sub>1</sub> and P-E<sub>2</sub> may be patched to the inputs of TAB for binaural recording from signals fed through the two preamps. This setup has been used recently for "off-the-air" binaural recording from simultaneous AM and FM transmissions. The system is easily modified for various binaural connections and will be obvious to the user.

Because the *Magnecord* has its own self-contained power amplifier, play-

Fig. 4. A simplified block diagram of the system. The jacks are connected as shown in Figs. 2 and 10.



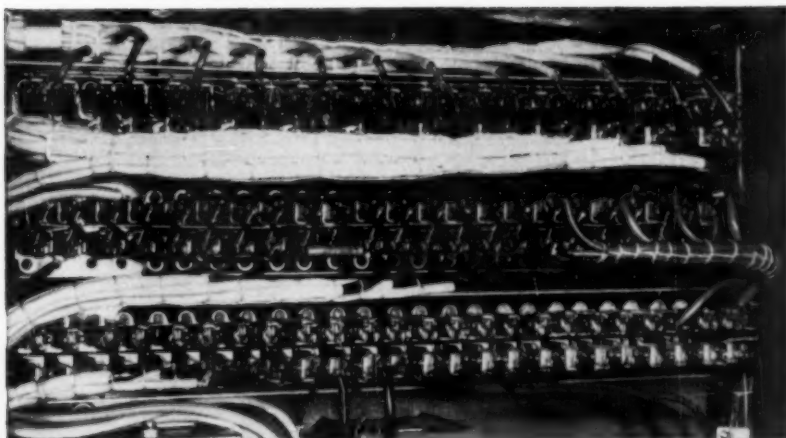


Fig. 5. Rear view of jack panels. The circuits are grouped at three (low, line, and power) levels to prevent crosstalk. See Fig. 6 for front view.

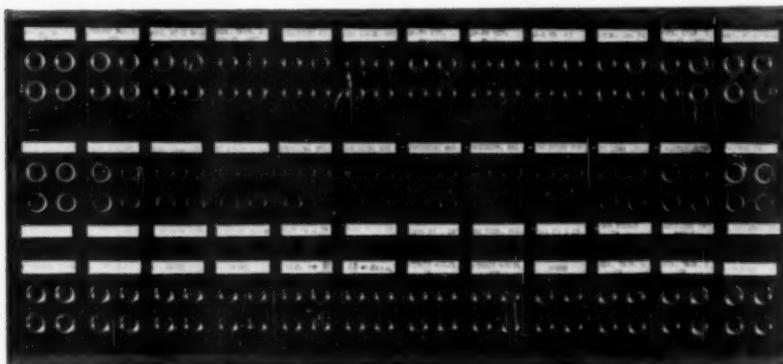


Fig. 6. The three double-jack panels. Jack frames must be grounded to rack.

back may be obtained through two identical speakers, separated by at least 8 feet, and with a very worthwhile spatial effect added by setting the preamp selector switches to positions 2 and B respectively, and by combining the two binaural signals through the system to a monaural speaker which is centrally located as a point source of sound. In practice, the effect is somewhat startling and, in many cases, especially in reproducing symphonic works, provides a most pleasing listening effect. It is important, of course, that all loudspeakers

be properly phased for binaural reproduction, and equally important to phase the monaural speaker when used in conjunction with this technique.

It is important to choose similar components for any binaural application. The *Fisher* and *Craftsmen* tuners, for example, have similar characteristics. They are both fed from a common high-gain FM antenna with isolating resistors of 1000 ohms connected as shown. In practice there has been no interaction using this method. (Continued on page 156)

Fig. 7. Signal circuits connect to the low-level, line-level, and power-level terminal blocks. Racks interconnect by means of three cables not shown in photo.

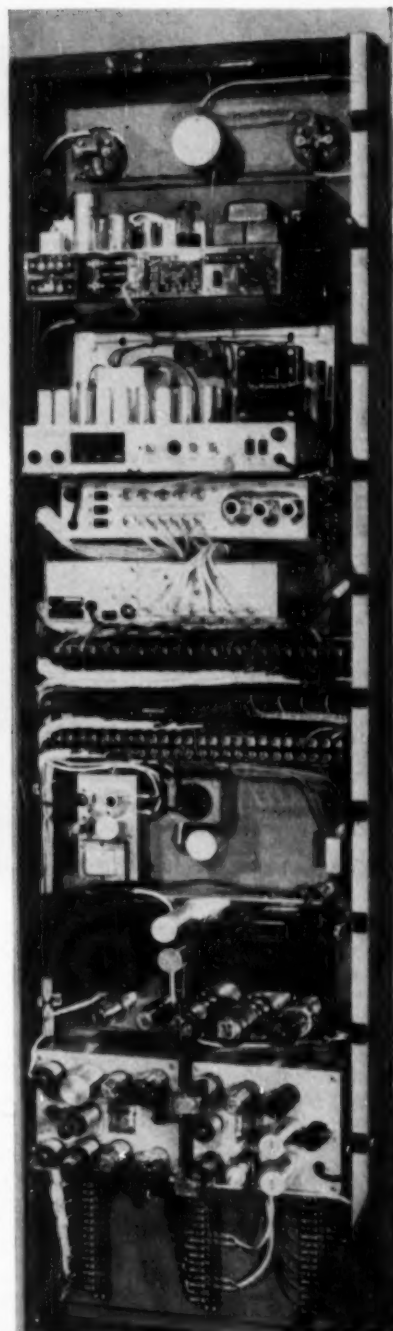
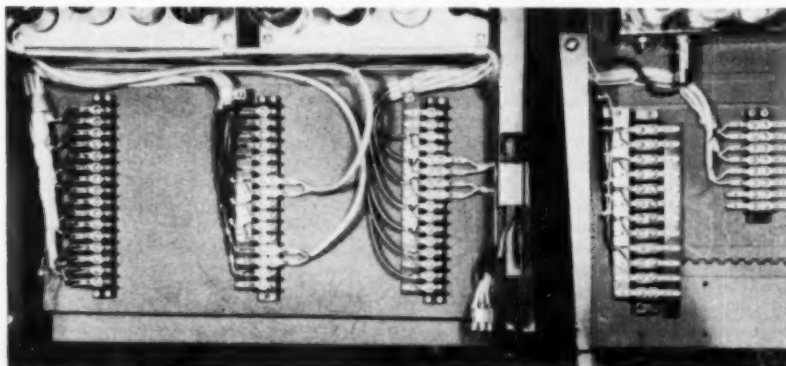
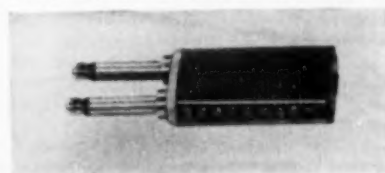
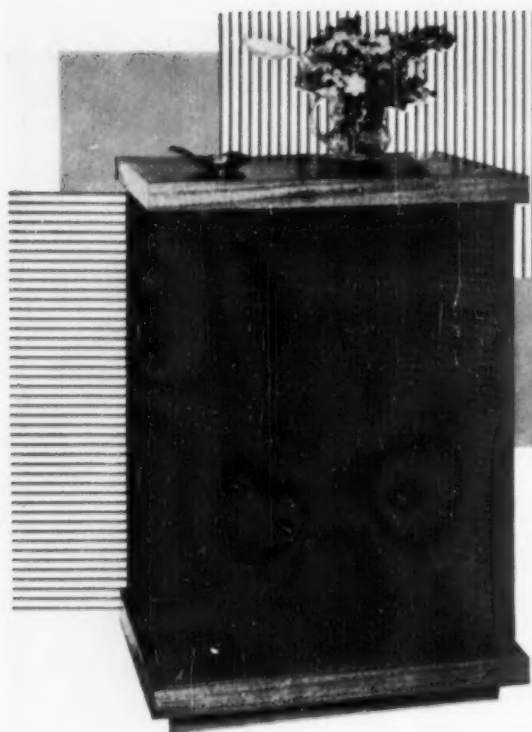


Fig. 8. Over-all rear view of the control rack. Low-level and line-level circuits (left side) and power level and a.c. (on right side) prevent crosstalk in system.

Fig. 9. Plug for double-jack system. Notches serve to indicate polarity and usually are inserted with these on the left side.





# The Purist A NON-CORNER HORN

By  
**EDWARD J. GATELY, JR.**  
and  
**THOMAS A. BENHAM**  
Gately Development Laboratory  
Clifton Heights, Pa.

"The Purist," a commercial version of a non-corner horn.

*Evolution of a non-corner horn which meets seven exacting criteria as to appearance, size, performance, and price.*

**D**URING the past decade more attention has been devoted to loudspeakers and loudspeaker enclosures than almost any other phase of audio development. This has been so because the loudspeaker and its necessary housing has been and still is the weakest link in the audio chain with respect to distortion, frequency response, transient response, and power handling ability.

The authors have spent the last year working out a horn-type enclosure which does not rely on the corner of the room to act as an extension of the horn mouth. At the outset, the following criteria were established:

1. The mouth area of the horn should be adequate to eliminate reflections from the horn mouth and to avoid standing waves inside the horn.

2. The horn should have a slow taper rate in order to obtain extended low-frequency response.

3. The ratio between the effective area of the speaker and the area of the throat of the horn should be approximately unity to insure close coupling while avoiding distortion due to non-linear compression of the air.

4. The design should be completely non-resonant in order to preserve transient response and avoid the "Johnny One Note" bass.

5. The air loading on the speaker should be increased in order to reduce

speaker distortion, increase power handling capabilities of the speaker system, and improve the acoustic damping on the speaker cone.

6. The size of the enclosure should be such that it will fit into the average living room without dwarfing the grand piano.

7. The styling should be such that it will match both modern and traditional decor.

Early experimental work indicated that a horn which exhausted on the front of the cabinet would not be practical because the horn would have to be much too large to meet the criterion for compact size. Further work on the problem indicated that a horn exhausting on the sides might result in an increase in the effective mouth area by the formation of images of the mouth along the wall and floor. A horn of this type was constructed. Fig. 1 shows a cross-sectional view of this design and illustrates how the enclosure exhausts on both sides. Fig. 2 shows images of the horn mouth. However, this enclosure proved to be too large if the other criteria were to be met and this approach was abandoned.

Next, the principles underlying the "Super Horn" design were re-examined. Fig. 3 shows a cross-sectional view of the "Super Horn" and Fig. 7 shows the same cabinet with the front grille cloth and frame assembly re-

moved to illustrate the acoustic images formed by the floor and walls of the room. Images  $I_1$ ,  $I_2$ , and  $I_3$  are real images and  $I_4$  and  $I_5$  are virtual. The existence of these images can be easily proved by setting up three hand mirrors in a mutually perpendicular configuration so that they represent the walls and floor of a room. Inserting a small piece of paper in the position that the horn mouth would normally occupy will clearly illustrate the manner in which the acoustic images are formed. This same technique can be followed with the other enclosures referred to in this article.

Fig. 4 shows how two "Super Horns" may be used side-by-side along a flat wall. This is possible because each horn appears to the other as a wall and the expected images are formed along the wall and at the floor. However, an enclosure of this type is difficult to style so that it will fit in with conventional furnishings. Fig. 10 shows how four of the "Super Horns" could be used in the center of a room. Each horn gains its images from the presence of the others and the floor. If this configuration is cut along line A-A' a conventional rectangular enclosure results. The fact that an enclosure of this type exhausts on three sides enables it to use the walls on both sides and the floor in front to gain adequate mouth area by the image method. Fig. 8 illustrates the formation of these images. A rearrangement of the upper internal baffles simplifies construction and increases the internal bracing of the enclosure. This approach enables us to satisfy the criteria established for such an enclosure.

The commercial models of this improved enclosure have been named "The Purist". Fig. 9 gives the im-

(Continued on page 142)

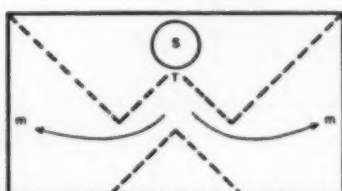


Fig. 1. Front view showing horn path in an early experimental wall horn model.

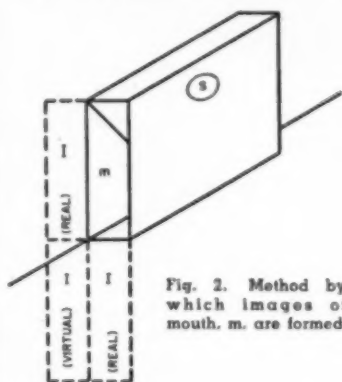


Fig. 2. Method by which images of mouth, m, are formed.

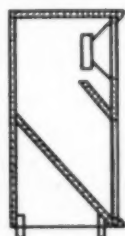


Fig. 3. Cross-section view of the company's "Super Horn" enclosure, as described in the Sept. 1953 issue.

Fig. 4. How two "Super Horns" can be used along a wall and how images are formed. See text.

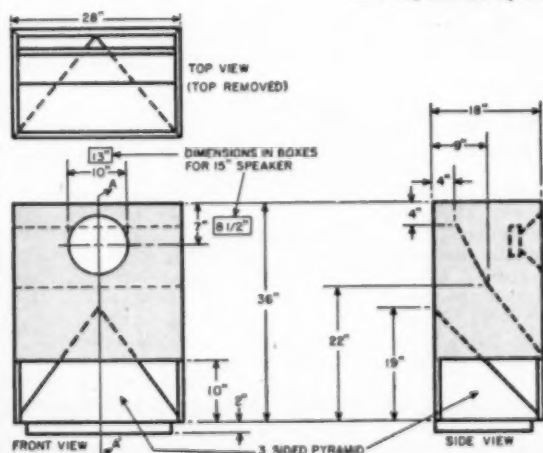
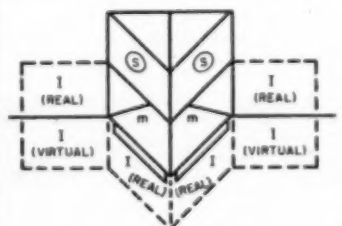
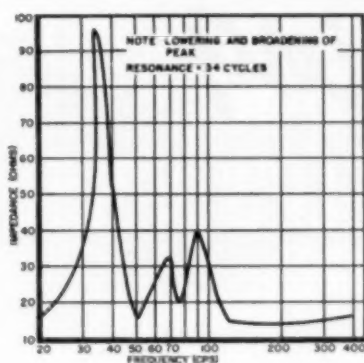
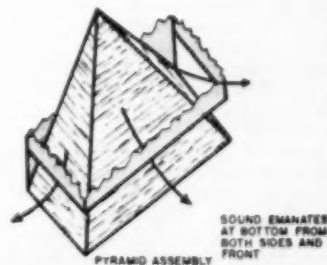


Fig. 5. Complete mechanical details for building "The Purist" enclosure. Care must be taken to insure an airtight seal otherwise performance will be impaired. All joints should be both screwed and glued for rigidity.



Impedance curve of a 15-inch speaker in "The Purist." The Chamber for this test was deliberately unpadded to show any standing waves or reflections.

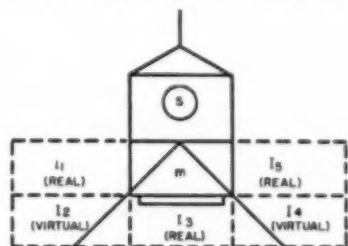


Fig. 7. Front view of the "Super Horn" (also shown in Fig. 3) illustrating how the images are formed. See text for details.

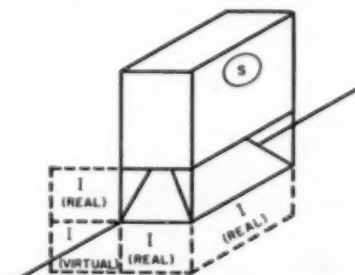


Fig. 8. "The Purist" located along a wall, showing method by which images are formed.

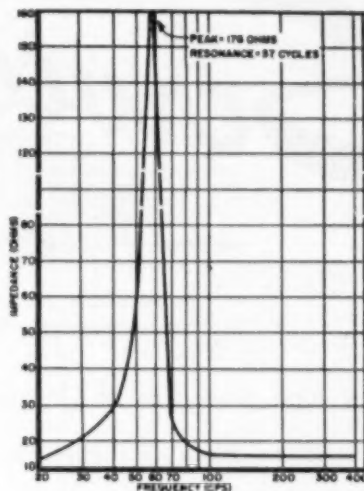


Fig. 9. Same speaker as in Fig. 6 mounted in well-padded infinite baffle of the same dimensions as "The Purist" cabinet.

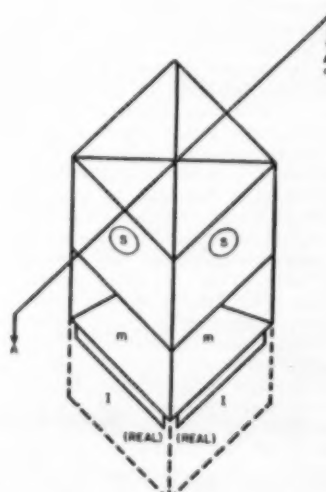


Fig. 10. Four "Super Horns" located in the center of room and how images are formed.

# Servicing

## TV LOW VOLTAGE SUPPLIES

By **MILTON H. LOWE**  
Coastal Publications Corp.

*A high proportion of TV troubles occur in the "B" power supplies. Here are the various types with service tips.*

**T**HIS article is intended for those service technicians who mistakenly feel that the easiest troubles to clear up are those which develop in the TV receiver "B+" supply.

The newer types of low-voltage supplies, as used in 1953-1954 receivers, differ in certain respects from their earlier counterparts. You can no longer expect to find only a straightforward full-wave supply comprised of one or two dual-diodes and associated circuit components, or a few selenium rectifiers stacked to function as a voltage doubler or tripler. Rather, you can expect to find two separate full-wave circuits which supply both low and high "B+" potentials, or other modified versions of the old full-wave circuit. In addition, a number of manufacturers have been forced to return to electromagnetic speakers, due to the defense effort requirements for magnetic materials, and this has resulted in the use of the speaker field coil as the filter choke which has a definite bearing on troubleshooting. Complicating the problem still further is the variety of power supply hook-ups, and the manner in which the d.c. is distributed to the various stages of the receiver.

In general, there are three categories of low-voltage supply troubles. First, there are those which are definitely "B+" supply troubles. That is, the symptom indicates trouble in the "B+" supply and the trouble is actually located there. Second and third, are those which may be in the "B+" supply. These include those troubles whose symptoms indicate a defect in the low-voltage supply, but whose actual trouble location is elsewhere; and those which don't look like power supply troubles, but are. The latter two categories are the most troublesome. The ability to recognize each type supply, and understand its particular features, is essential to efficient troubleshooting.

Fig. 1 is the simplified schematic diagram of a seemingly familiar basic type of low voltage power supply. As

far as the supply itself is concerned, it consists of a single 5U4G connected in a full-wave rectifier circuit with a single "pi" section filter. The choke in this filter is the field coil of the speaker. The easiest way to recognize this type supply is either to look at the speaker to see if it is an electromagnetic type, or to look at the chassis to see if a filter choke is mounted in the vicinity of the supply.

In tracing through the entire schematic of this receiver, a number of interesting points were noted and incorporated in the simplified diagram. These have to do with the use of tubes functioning as voltage dividers, in addition to their normal function. The audio output tube, for example, is connected in series with the plate circuits of the tuner, the sync circuits, the video amplifier, and the a.g.c. delay circuits—all across the power supply. Thus, if the sound output stage should become defective, the potential developed in its cathode circuit would change, and the aforementioned stages would operate improperly, if at all. Notice also, that the plates of the 1st and 2nd i.f. amplifiers are effectively in series. The cathode of the 2nd i.f. amplifier operates at approximately 120 volts above the chassis ground potential and thus supplies the plate of the 1st i.f. amplifier with its plate potential. Therefore, if either the 2nd or the 1st i.f. amplifier tube becomes defective, the "B+" voltage to the other stage will suffer.

In all the receiver models represented by the schematic in Fig. 1, except the 19B1, a cascode type tuner is used. The circuit hook-up in the tuner is such that the plates of the r.f. amplifiers are in series, in much the same manner as the i.f. amplifiers. Therefore, if the r.f. amplifier tube should become defective or is removed from its socket, there will be no "B+" voltage for the 1st r.f. amplifier at pin number 1 of the socket.

Now, examine the heater circuit connections. Notice that this is rela-

tively straightforward, with the tubes grouped in banks so as to distribute the heater current drain uniformly, and with the tubes in the tuner furthest from the 6.3 volt winding of the power transformer. This is done to minimize heating fluctuations of the cathodes and thus reduce some of the noise generated in the tube.

Finally, notice that the transformer is completely shielded, both primary from secondaries, and the case itself. This tends to eliminate any vertical modulation of the raster which may result from a difference in the local power source frequency and the transmitted vertical sync pulse recurrence frequency.

Another receiver which, as far as the power supply is concerned, is almost identical to the *Admiral* schematic shown in Fig. 1 is the *Capehart* model CX-37. The principal power-supply difference is that a conventional filter choke is used in the *Capehart*, inasmuch as the speaker is of the permanent-magnet type.

The only test equipment required for locating trouble in the power supply is a combination voltohmmeter, preferably a v.t.v.m. All measurements are taken with respect to the established reference level. In some circuits, this reference level is the "B—" bus, in others, it is the chassis. The first measurement to be taken is the potential at the output of the filter, point 1 in Fig. 1. In most supplies of this type, the potential at this point is +250 volts with respect to ground. A tolerance of 10% is usually allowed. If this potential is incorrect, the next step is to measure the a.c. line voltage across the primary of the transformer. This is usually from 110 to 120 volts a.c. If this voltage is low, the "B+" voltage will be low and, conversely, if it is high, the "B+" will be high.

Assuming that the input voltage is correct, the next step is to measure each half of the secondary voltage. This is usually about 275 volts a.c. from the center tap to either side. Do not attempt to measure the full secondary voltage unless the meter test leads can withstand a 600 volt potential and you are extra careful not to get across the secondary. Failure to obtain a step-up ratio of 1 to 2 or more (for each half of the secondary) usu-

ally indicates a defect in the power transformer.

If the correct potentials are obtained at the transformer, measure the d.c. voltage at the input to the filter, point 2 in Fig. 1. This will usually be from +20 to -20 volts d.c. more or less than the a.c. voltage measured across half the secondary. The exact figure depends upon the load on the power supply, and the value of the condenser used on the input side of the filter. If a potential of about +275 volts is not obtained, the trouble may either be a weak rectifier tube or a filter condenser whose value has decreased due to aging. If the filter input voltage is correct, but the filter output voltage is not, the trouble is either due to a defective field coil or unusually heavy load, which might be caused by a high resistance short in one of the receiver stages. This can be tracked down by testing "B+" voltages to each stage and comparing these readings with the normal measurements in the service data.

### Dual-Type Supplies

In Fig. 2 is shown the simplified schematic diagram of the low-voltage power supplies of the CBS-Columbia receiver models 21T11, 21C11, 21C21, 21C24, and 21C31B. This dual-type low voltage supply is becoming increasingly popular because it provides for more efficient "B+" voltage distribution and better regulation of the individual "B+" voltages. The lower voltage supply utilizes a 5Y3 connected in a full-wave circuit with a single section "pi" filter. The maximum current capacity of the 5Y3 isn't as great as that of the 5U4G (which is used in the higher supply), but in this case it is sufficient because the lower voltage potential is applied to the stages that draw little current. These stages are the video amplifiers, sync circuits, i.f. amplifiers, 4.5 mc. sound i.f. amplifiers, and the mixer-oscillator in the tuner. The higher "B+" potential is applied to the vertical and horizontal sweep circuits, the sound output stage, the damper, and the r.f. amplifiers in the cascade tuner. The 1st r.f. amplifier receives its plate voltage from the cathode of the 2nd r.f. amplifier, as is usually the case in cascade tuners. The heater hook-up is straightforward, with the heaters of the tubes in the tuner and the i.f. amplifier decoupled from the other heaters by means of inductor-condenser networks.

The technique for locating trouble in this type supply is similar to that discussed for the circuit of Fig. 1. One of the differences, of course, is the fact that the two supplies in Fig. 2 have different a.c. potentials applied to the plates of their rectifiers. The potential at the plates of the 5U4 is approximately 320 volts a.c. and that at the plates of the 5Y3 190 volts a.c. The voltage at point 1 is approximately +350 volts d.c., and that at point 2, approximately +160 volts d.c.

Heater decoupling networks have been incorporated in the tuner, i.f.

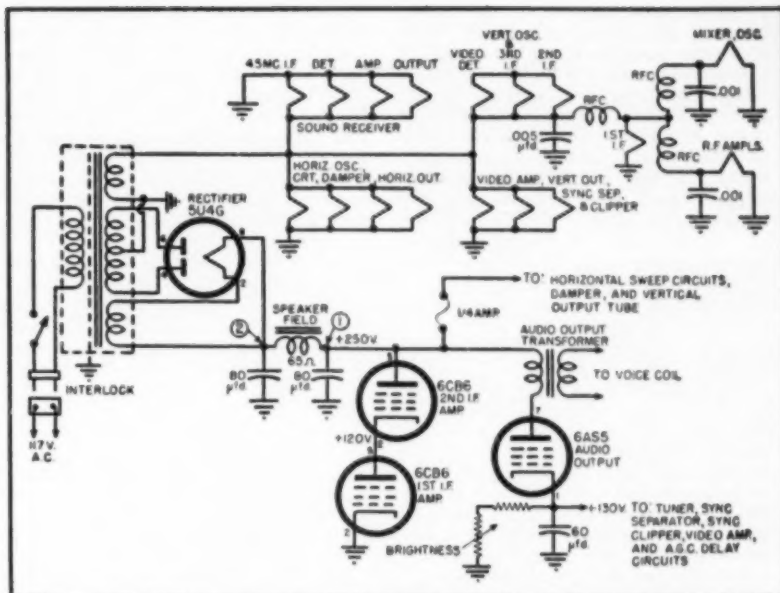


Fig. 1. Low-voltage power supply of the Admiral 19B1, 19C1, 19E1, 19F1A, and 19H1.

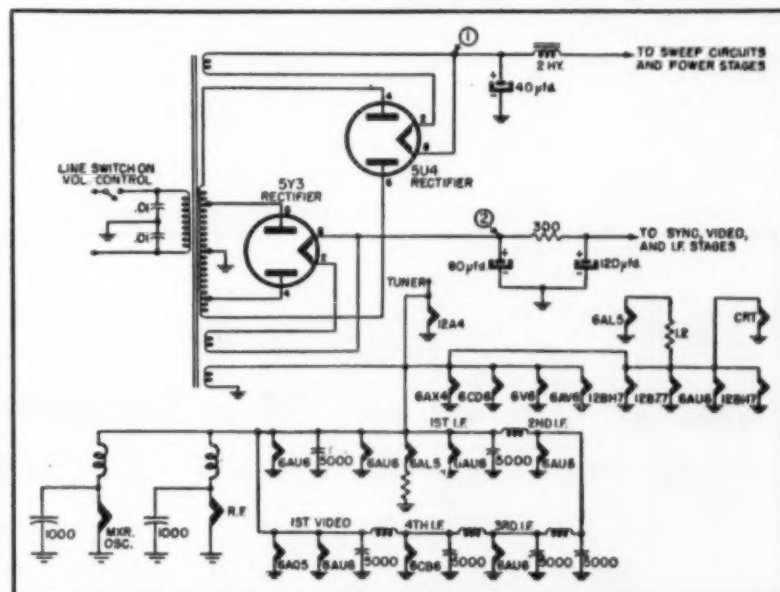
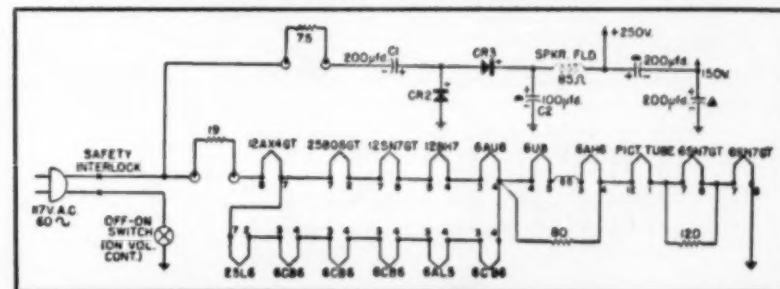


Fig. 2. Dual-type supply found in some CBS-Columbia, Admiral, and Zenith receivers. The "B+" circuits fed by each rectifier are selected according to their current requirements; thus, the sweep and power stages obtain their "B+" from the 5U4 tube, whose maximum current capacity is higher than that of the 5Y3, used for other stages.

Fig. 3. Transformerless power supply found in the Motorola TS-400A and TS-410A.



amplifier, and video amplifier stages because the heater-to-cathode inter-electrode capacity of the tuner and i.f. tubes provide a low impedance path by which the r.f. and i.f. signals can be coupled to the video stages. This would cause the picture to have alternate dark and light lines that could be horizontal, vertical, diagonal, or combinations thereof. This interference can readily be recognized by the fact that r.f. interference due to external causes appears only on certain channels depending upon the frequency of the source of interference, whereas the internal interference due to defects in the heater decoupling networks is likely to occur on all channels.

The troubles most likely to occur to the decoupling networks are open or partially shorted inductors or an externally shorted condenser. The condensers are usually mica and since they are worked at a low voltage level, they are unlikely to short or open internally, or become leaky as paper condensers do. The inductors however, are fragile and likely to be damaged if abused, or open if the heaters to which they are connected should short and draw excessive current. You should be able to smell these inductors if they have been overheated. If the r.f. choke in series with the r.f. or mixer tubes should open, these tubes would not light. If another r.f. choke opened, the heaters in its string would not light.

A good point to remember when servicing this type of circuit is that a

5U4G, whose emission has dropped off below the point where it can be used satisfactorily in the higher supply, may be directly substituted in the low "B+" supply. No alterations need be made in the wiring, because the plate and filament connections are the same for both tubes. Notice that a filter choke is used in the higher "B+" supply to take care of the greater pulse and transient content of the sweep circuits.

Other circuits which are very similar to the one shown, are the *Admiral* chassis 23A1 and the *Zenith* models K2872R and K2873E. The principal circuit difference is that both the *Admiral* and *Zenith* chassis use two 5U-4G's. Also, the filter networks are more elaborate and use chokes throughout instead of resistors.

Another popular type of supply is shown in Fig. 3. This circuit uses two selenium rectifiers in a half-wave voltage-doubler circuit to obtain a "B+" voltage of 275 volts from the 117 volt a.c. line. The 7.5 ohm surge resistor limits the current that can flow through the filter condenser  $C_1$ . Notice that the speaker field coil is used in the "pi" section filter. This supply makes use of the audio output tube to furnish the low "B+" of 150 volts in a manner similar to the circuit shown in Fig. 1. From Fig. 3 it may appear as if the 150 volts is derived from a capacitive voltage divider, however, this is not the case. The 150 volt point is taken from the cathode of the

audio output tube. The 200  $\mu$ fd. electrolytic condenser merely gives additional filtering for the "B+" at that point. The higher "B+" voltage is applied to the power stages, damper, etc.; the lower "B+" voltage is applied to the other circuits.

Since this is a transformerless receiver, the heaters are hooked-up in a series-parallel combination so as to drop the entire line voltage in conjunction with the 19 ohm line dropping resistor. Receivers which make use of this type supply (besides the ones given in the caption of Fig. 3), are the *Motorola* chassis TS-395A and the *Crosley* chassis 385, 386, and 387. These receivers, however, use a special transformer to obtain heater voltages only. These heater-transformer types are much easier to troubleshoot because one burned-out heater won't cause the whole string to go out.

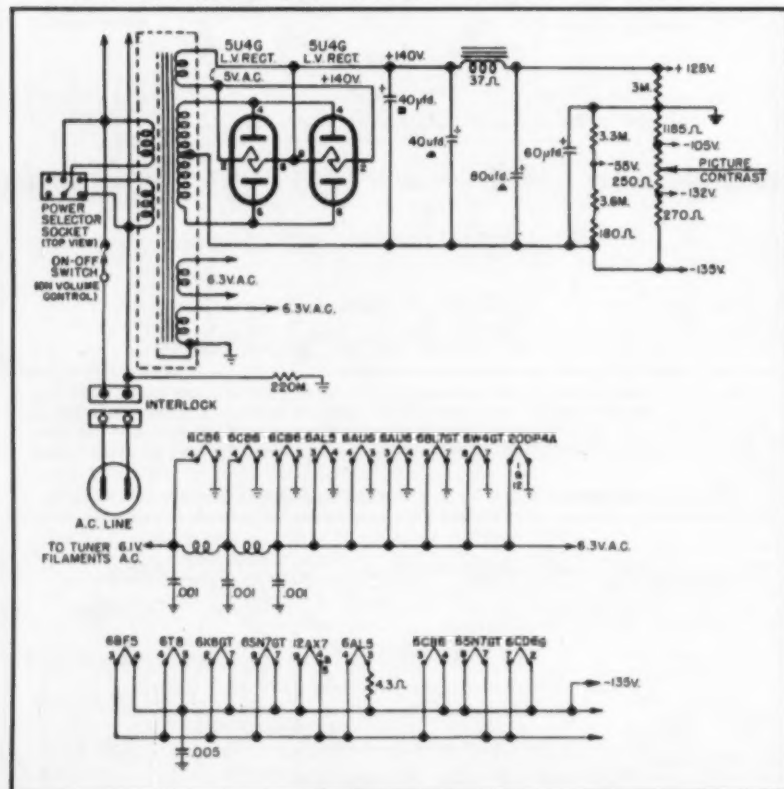
The most difficult task when troubleshooting a supply that uses selenium rectifiers is to determine whether or not the rectifier itself is defective. There are two qualitative tests that can be performed to determine the quality of the suspected rectifier, but the results must not be accepted as conclusive, just as checking certain types of tubes with a tube tester is not the perfect method of determining whether or not the tube will work in the given circuit. For the first test for selenium rectifiers, use an ohmmeter to check the forward and reverse resistance readings of the rectifier. Of course, the power must be off, and the circuit leads disconnected from the selenium stack. The ratio of back-to-forward resistance should be at least 100 to 1 if the rectifier is to be considered satisfactory. The other test is to measure the voltage drop across the rectifier while the receiver is in operation. If a drop of more than 5 volts is measured across the stack, the rectifier is probably defective.

### Bleeder-Type Supply

A typical bleeder-type supply is shown in Fig. 4. Except for minor differences in the voltage dividers and their filters, this type supply is found in the latest *Du Mont*, *Emerson*, *Andrea*, and *DeWald* models. This circuit stems back to the old 630-type supply. Its principal innovation is that the voltage divider outputs are approximately equal, negative and positive, rather than just a few volts negative (for bias) and the rest of the potentials positive. The main advantage of these negative and positive potentials is that it allows for more versatile circuit connections, and thus results in a receiver whose over-all design is greatly improved. Notice that the power transformer is completely shielded, as it was in the *Admiral* model shown in Fig. 1. Two heater secondaries are required to minimize heater-to-cathode potential differences. One heater winding supplies those tubes whose cathodes are operating at or near ground potential. The

(Continued on page 144)

Fig. 4. Bleeder-type supply found in the Sylvania models 22M-11A and 22M-11B.



# REVIVING THE JAM-JAR RECTIFIER

By ELBERT ROBBERTSON

*Remember, Old-Timers? The electrolytic rectifier, a cheap, rugged d.c. source.*

**H**AMS of twenty-five years ago had an easier time than today's crop. Tubes had only three elements, and to get high-voltage d.c. a tray full of *Mason jars*, affectionately dubbed the "slop rectifier," was commonly used. Once in a while it was also called a "chemical" or "electrolytic" rectifier.

The materials were cadged from the junkyard and the jam closet, so the cost was nil; and no filament transformer was needed. As the "bridge" connection was used, a center tap was unnecessary, and the d.c. voltage output was equal to that of the a.c. input.

Furthermore, the output was so smooth that the only filtering needed was a couple of microfarads—and you could even use jam jars for this, too. For, besides being rectifiers, these jugs were also self-healing electrolytic condensers!

Although seldom heard of today, they still work—and a little re-designing has brought them up-to-date.

To compare the old and the new, one of the old jugs is shown in the first illustration, alongside a 1953 version. The 4-cell unit will give about 117 volts intermittently, or 80 volts all day.

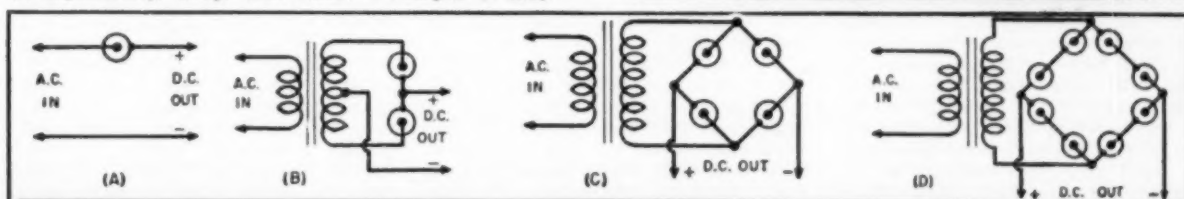
Construction is simple. Certain metals form an oxide coating when subjected to a current flow in an electrolyte. This coating acts as an insulator for current in one direction, and a low resistance the other way. Thus, it will rectify a.c.

The most plentiful of these metals is aluminum, in a solution of borax. The other electrode can be lead or iron.

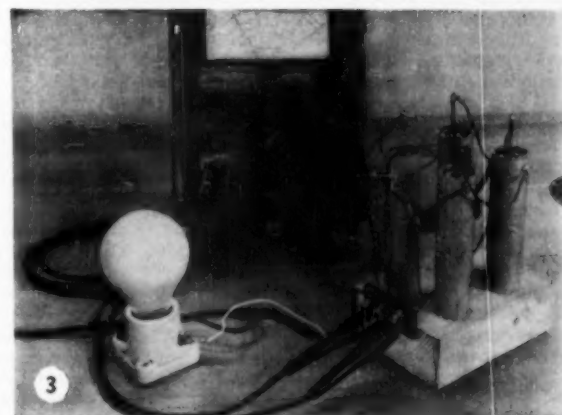
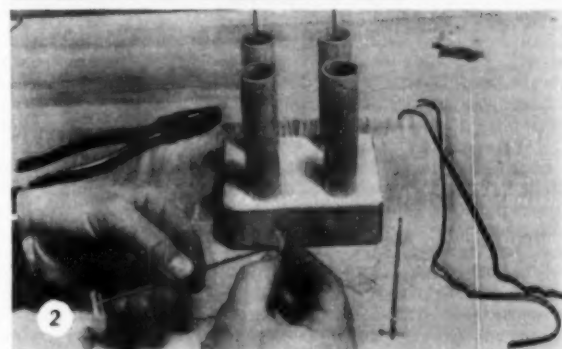
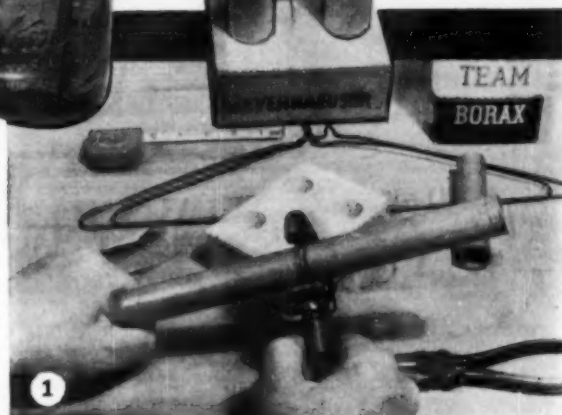
Whereas a generation ago a bank of such cells would be made of glass jars holding (Continued on page 160)

Pictures at right show steps in making rectifiers. (1) Preparing materials: 5" lengths of 1" aluminum tubing, coat hangers, wood block, borax. (2) Fitting plastic spacers,  $\frac{3}{8}$ " square, to the wire anodes. (3) "Forming" the rectifier bridge, by connecting it to the a.c. line in series with a 100-watt bulb. As oxide forms on the aluminum, the bulb dims, d.c. output rises.

Fig. 1. Possible connections. (A) Half wave, not very useful. (B) Ordinary full wave center-tapped. (C) Bridge connection. (D) Higher-voltage bridge (cells added in multiples of four).



One of the old jam-jar rectifiers shown with today's streamlined version. The older type had aluminum and lead sheet electrodes; newer uses tubing and ordinary wire coat hangers in its construction.



# the CBS Colortron



Fig. 1. Over-all view of CBS-Hytron's picture tube for color television. It is engineered so that it may be produced in quantity.

By

ROBERT B. TOMER and WILLIAM R. SULLIVAN  
CBS-Hytron

*A new color tube—although its operation is basically identical to the RCA tube, its mechanical construction is so different that production problems are eliminated and restrictions on potential tube sizes are removed.*

It has long been recognized that one of the principal obstacles to low-cost, mass-produced color television has been the means by which the colored picture was reproduced. In recent years, most of the effort in this field has been directed toward perfecting a cathode-ray tube, capable of creating colored pictures in much the same manner as those used in black and white television. The problems involved in the successful accomplishment of this objective are prodigious. However, there has been tremendous progress in the direction of solving many of them.

Until recently, the only successful color tubes which had been demonstrated were exceedingly difficult to manufacture and almost as difficult to adjust and maintain in operation. With the announcement by CBS-Hytron of its new CBS-Colortron, the last barrier to mass production color television appears to have been removed. This new tube makes use of principles already demonstrated as being sound in earlier color tube designs and goes beyond that point to achieve a simplicity of design closely approaching that of black and white tubes.

Before discussing the improved features of the CBS-Colortron, a review of the earlier type of color tube may be helpful. One of the most successful of these earlier color tubes makes use of the principle of parallax to achieve the necessary separation of the three primary colors within the same tube structure. Three electron guns, located in the neck of the tube, are modulated by three individual signals. The beams from these three guns are aimed so as to come together, or converge, upon a mask containing a

multiplicity of small holes. As the three beams pass through the holes in the mask, they become divergent again and arrive at the screen as three individual beams. The screen is printed with three types of phosphor, capable of producing the three primary colors—red, green, and blue. The individual phosphors are printed as very small dots on the screen and are arranged in groups of three so as to form little triangles, or triads, each containing a red, a green, and a blue dot. As the three individual beams strike the screen, they are caused to fall exactly over the center of one of the three color dots. Thus, the beam from the red signal gun passes through the mask and travels on to strike the red dot on the screen. The beam from the green signal gun passes through the same hole to continue on and strike the green dot. The blue dot is excited in like manner. This principle of separation by parallax is shown in Fig. 3A.

As stated earlier, tubes utilizing this principle have been demonstrated before. Their chief drawback has been their inherent complexity of construction and their dependence upon highly skilled artisans during their assembly. It has been because of these factors that the first estimates of color television set costs have been so high. It was inevitable that lower cost and more reliable designs would be sought. The CBS-Colortron is the result of such an effort.

The color television picture tube differs from its counterpart in black and white in three essential respects. It is these basic differences which will ultimately determine the cost differential between a color television picture tube and a black and white tube. The first

of these differences is in the gun structure. The color picture tube in its present practical form requires three electron guns as compared to only one in the black and white tube. While it may conceivably become possible to design color tubes in the future, having only one gun, at present the three gun design seems to be the only practical design for a compatible color system.

The second essential difference consists of the mask which permits the three beams to be separated at the screen for proper color registration. There is no way of eliminating this added element in the parallax type of color tube. However, its method of fabrication and assembly leaves much latitude for improvement and consequent cost reduction.

The last essential difference consists of the special tri-phosphor screen, used in color television tubes, as compared with the simple screen used in black and white television. There appears to be no possibility of eliminating this essentially complex part of the color tube. However, once again the method of producing the screen leaves considerable area for improvement.

It has been in the latter two areas that the greatest significant advances have been made in the CBS-Colortron. Earlier designs made use of a flat, prestretched mask, firmly bolted to a heavy spacer frame, which was in turn clamped to the glass plate containing the phosphor dots. This assembly was not only difficult to maintain in proper registration during its assembly, but created equally difficult problems in evacuating and outgassing the completed tube. Because of the large mass contained in this structure, the time required to raise and lower the temperature of the entire tube during the evacuation process was considerably longer than for black and white tubes. This, of course, added to the ultimate cost of such a tube. In addition, the losses due to non-linear expansion and contraction in this sub-assembly ran very high, adding even further to the cost.

Other factors contributing to the high cost in the earlier flat mask type

of color tube were such items as an internal decorative mask and the use of an additional glass panel used to seal the open end of the tube and serving as a window through which to view the phosphor screen mounted inside the tube. Both of these items are eliminated in the CBS-Colortron.

In order to achieve a significant reduction in the cost of preparing the phosphor screen, a new method of printing the dots had to be developed. The method used in the earlier color tubes was a silk screen process. This is a sort of stenciling operation where a silk screen, containing a pattern of holes, is laid over a flat glass plate and the phosphors are forced through it onto the glass by a wiping or squeezing motion. The process is essentially a hand operation, requiring a high degree of skill and experience. Since it must be repeated three times on each screen, the possibility of error multiplies rapidly.

A method of depositing the phosphor dots through the use of photographic techniques has been perfected which results in a great improvement in accuracy and which is capable of being performed by automatic equipment, thus effecting a substantial reduction in cost. This photographic technique has certain other advantages that may exceed those of direct cost. Through the use of this technique, it has been possible to eliminate the use of a separate piece of flat glass for supporting the phosphors. They can now be deposited directly onto the faceplate as in the black and white tube. By eliminating the extra glass surfaces of the older flatplate color tube, contrast is improved in the picture because there is less light dispersion and fewer halations caused by room lights, windows, etc. Still another advantage accrues from the placing of the phosphors on the inside of the faceplate. This inside surface is, of necessity, a curved surface so as to be able to serve as an arch and support the weight of the atmosphere pressing in upon the faceplate which would otherwise cause it to collapse.



Fig. 2. The CBS-Colortron (top) in "exploded" form to show component parts as compared to the separate components which go to make up another type color tube.

The use of a curved phosphor screen permits the use of a matching, curved mask. This combination of a curved mask and a curved faceplate distinguishes this type of tube from the earlier flat mask and flat phosphor plate tube.

One of the most difficult problems for the circuit designer using the flat mask type of color tube is that of obtaining proper convergence over the entire screen area. Fig. 3B shows diagrammatically why this problem exists.

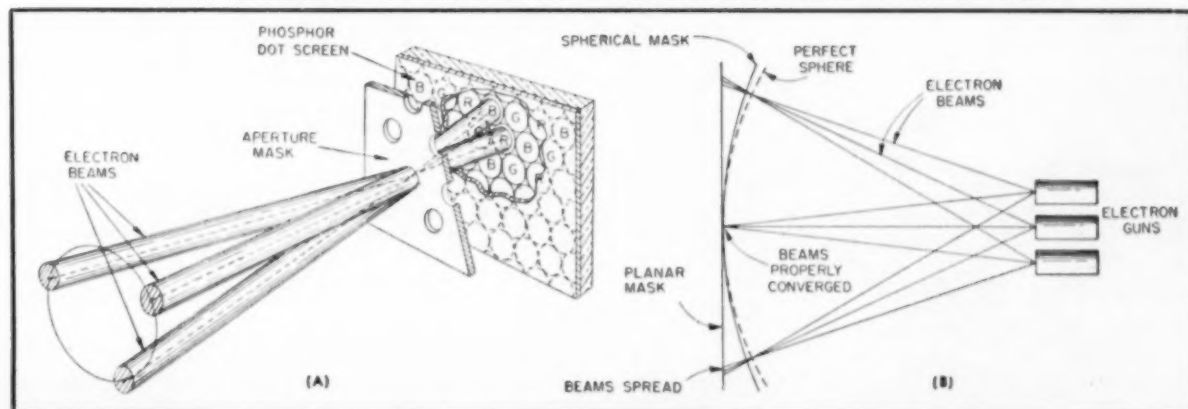
It can be seen that in the case of a flat mask tube, if the beams are brought to convergence at the center of the screen, they will not be properly converged out near the edges of the picture. This is because the beams describe an arc as they swing back and forth across the mask, and the mask, being flat, fails to coincide with the plane of their point of convergence except at one point. Dynamic

means of correcting this condition are required within the color receiver. A parabolic voltage waveform is required to modulate the convergence lens in order to shift the plane of the convergence point back onto the mask near its edges.

It is apparent from Fig. 3B that if the mask were a section of a sphere, the need for this dynamic convergence would be virtually eliminated. Actually, in a practical tube design, the mask and faceplate curvatures do not coincide exactly with the plane of the convergence point of the three beams. However, the correction obtained with even a moderate amount of curvature is considerable, and in the case of the CBS-Colortron, it is on the order of six to one over the flat mask type of tube. This means that the requirements placed upon the circuit designer are greatly lessened and the problems of the service technician in maintaining

(Continued on page 182)

Fig. 3. (A) Convergence of the three beams at the mask. Note that each beam passes through the hole in the mask at the correct angle to strike its corresponding phosphor dot. (B) Illustrating the need for dynamic convergence to correct for the variation in length from deflection point to the aperture mask as the beams travel from the center to the edge of the mask. Note that the use of a spherical mask reduces the amount of correction required.



# TROUBLESHOOTING

By  
**WALTER H. BUCHSBAUM**  
Television Consultant  
RADIO & TELEVISION NEWS

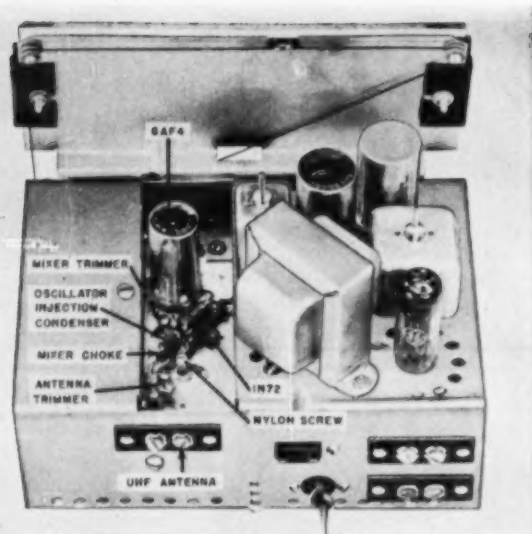


Fig. 1. Top rear view of the Mallory TV-101 u.h.f. converter. Note the socket with spring clips for the 1N72 crystal mixer.

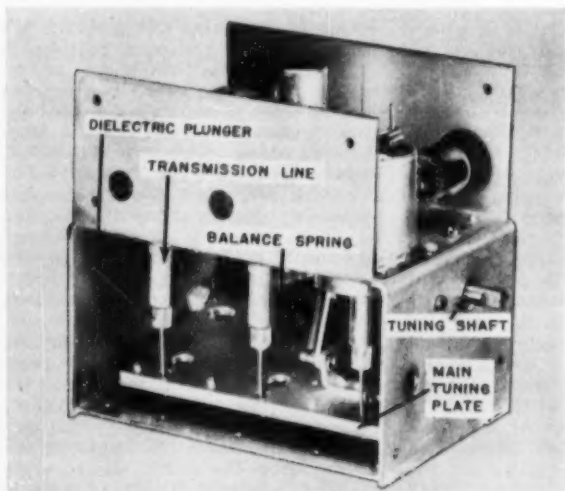
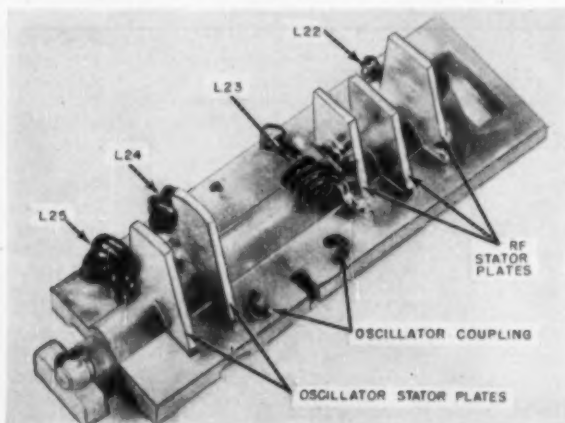


Fig. 2. Rear view of the Granco converter showing the two r.f. preselector and one mixer cavities with dielectric plungers.

Fig. 3. A typical u.h.f. coil strip for the Standard Coil 62 channel turret tuner. The vertical partitions are condenser plates.



**W**HEN u.h.f. tuners and converters first appeared in the customer's home, the average service technician often referred all service work to the manufacturer. As u.h.f. equipment becomes more popular and technicians have more opportunity to familiarize themselves with it, troubleshooting u.h.f. tuners and converters will become part of the regular TV service business.

This article discusses the basic u.h.f. tuner circuits, lists their defects, and describes a number of popular models and their typical troubles. The v.h.f. tuner or i.f. section which is often part of a tuner or converter is not considered here, since most service technicians are familiar with those sections.

The main difference between a u.h.f. tuner and a converter is its physical location rather than its electrical characteristics. If it is mounted in a separate box on top of the TV set, it is usually considered a converter, while the same unit, mounted on the main chassis and housed inside the receiver, is called a tuner. The u.h.f. circuits of both are identical and therefore subject to the same defects. For this reason, whenever we refer to a tuner, the same holds true for a converter and vice versa.

## Basic Circuit

The u.h.f. portion of all tuners to date consists of an r.f. network, a local oscillator, and a mixer. Some manufacturers are planning to use an r.f. amplifier stage for the u.h.f., but except for experimental models, none of the popular u.h.f. equipment now in use has an r.f. stage. A basic u.h.f. tuner circuit is shown in Fig. 5. To cover all channels, either  $L_1$ ,  $L_2$ ,  $L_3$ , or the corresponding condensers may be varied. In Fig. 5 the three resonant circuits are shown as simple coils and condensers, but transmission lines, parallel inductances, and switching networks are more commonly used. In commercial tuners the resonant circuits are often either shortened transmission lines or some other arrangement that permits varying the resonant frequency over a wide range. Some of the switch-type v.h.f.-u.h.f. tuners, such as the RCA KRK-25, actually use small coils and condensers. Some tuners make use of printed circuits, these are, however, rare.

When we consider the diagram of Fig. 5, the troubleshooting problem appears much simpler than when we look at the actual u.h.f. tuner. The number of possible defects due to the u.h.f. portion obviously is quite limited. We can list the potential defects for each section:

1. The r.f. network
  - a. Misalignment or poor tracking
  - b. Short or open in tuning condensers, coils, or contacts
  - c. High resistance solder connection
2. Mixer
  - a. Defective crystal or tube
  - b. Misalignment or poor tracking
  - c. Short or open in tuning condensers, coils, or contacts
  - d. High resistance solder connection
3. Oscillator
  - a. Defective tube
  - b. Wrong frequency or poor tracking
  - c. "B+" or heater chokes shorted, open, or grounded
  - d. Incorrect "B+" or heater voltage
  - e. Defective r.f. bypass condenser
  - f. Open or shorted coils, condensers, resistors, or contacts
  - g. Open or shorted oscillator injection loop
  - h. High resistance solder joint or bad ground

These cover practically all the electrical defects that can occur in a u.h.f. tuner or converter, but this does not

# THE U.H.F. TUNER

*With the proper equipment, service technicians can repair most u.h.f. TV tuners. Here's how.*

take into account such mechanical defects as broken dial cords, corroded contacts, misadjusted dials, burned-out panel lamps, etc. Any technician who has serviced a.c.-d.c. radios will be familiar with this type of trouble and, in any event, these mechanical defects are fairly easy to spot.

The fifteen items listed can produce a variety of symptoms and may require considerable servicing. The troubleshooting procedure will be simplified greatly if we keep these items in mind, because many of these defects can be checked fairly quickly.

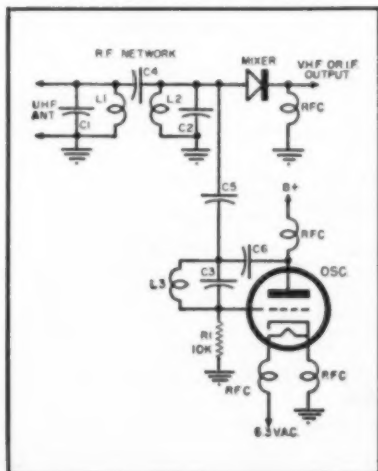
Before deciding that a particular defect originates in the u.h.f. section, a number of tests should be made to pin down the trouble. Usually, the only service calls due to the u.h.f. section are those where either nothing is received on the u.h.f. channel or the signal is weak, intermittent, or subject to interference. Such defects as unstable horizontal or vertical hold, distorted picture, and hum in the sound are never due to a tuner defect. Whenever more than one station can be received, the second station can serve as a check on the tuner operation. This holds true where one is on u.h.f. and the other on v.h.f. If the defect appears on both stations, the u.h.f. section is obviously blameless. Even where two u.h.f. stations only are received, chances for mistracking on both are small. However, some of the other items on our list of defects will hold for the entire u.h.f. band and can not be checked in this way.

The four general symptoms for defective u.h.f. tuner operation can each be traced to particular defects, and can each be located by definite tests.

1. *No u.h.f. reception:* To make sure this is due to the tuner, check whether a v.h.f. or another u.h.f. station can be received. Where no other signals are available, connect a v.h.f. or i.f. signal generator to the output of the u.h.f. mixer and modulate the signal with 400 or 1000 cycles. If bars appear on the screen, the u.h.f. tuner or antenna is at fault. Check the antenna installation for broken wires or bad connections. To service the tuner, do the following:

a. Measure "B+" and heater voltages. Check these voltages at the u.h.f. tuner terminals as well as directly on the pins of the oscillator tube socket.

Fig. 5. Basic u.h.f. tuner circuit.



December, 1953

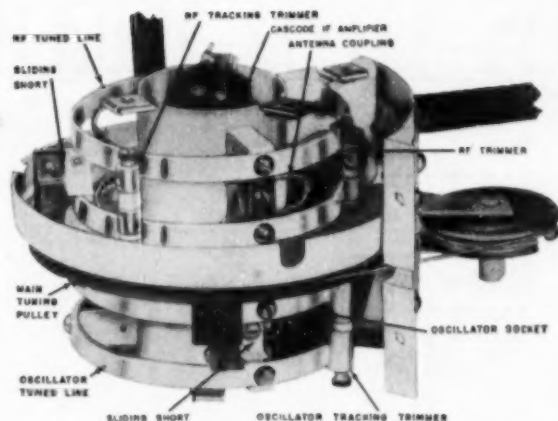


Fig. 4. The Kingston u.h.f. tuner, used in Regency converters. Note the parallel transmission lines and sliders for tuning.

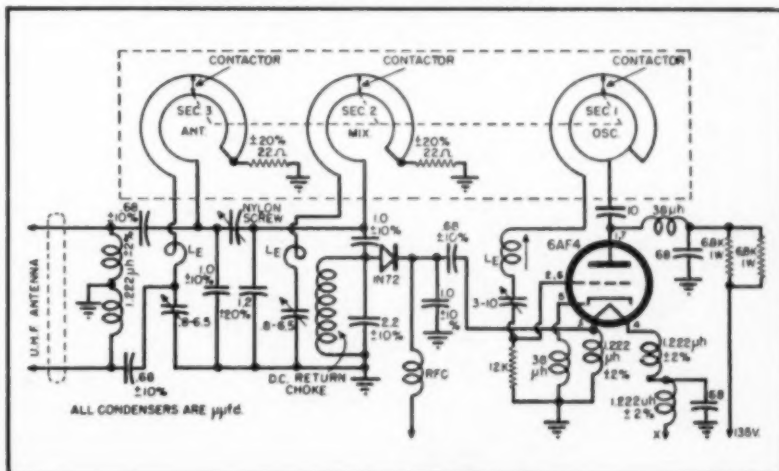
b. Replace oscillator tube, then replace mixer crystal.  
c. Check all coils for opens; all tuning condensers for shorts.

d. Connect u.h.f. sweep generator to antenna input and observe response on scope. If nothing gets through, one of the components in the r.f. network is probably open or shorted. Try another mixer crystal or substitute a u.h.f. crystal detector probe.

e. If the r.f. network is OK, check the oscillator for oscillation. Connect the v.t.v.m. with a 1-megohm series resistor to the oscillator grid and check for negative grid bias. Tuning the oscillator, or placing a grounded object near one of the tank coils should vary this bias considerably. To check frequency, use a grid-dip meter and observe the dip in bias voltage when the oscillator and grid-dip meter frequencies coincide. Another way to determine frequency is with a sweep generator and oscilloscope. Tune the r.f. network and sweep generator until a "birdie," due to the local oscillator, is visible. To make sure that the "birdie" is created by the oscillator, place your screwdriver on the oscillator grid and observe that the "birdie" will shift or disappear. The frequency of the local oscillator is found by tuning the marker signal, sometimes part of the sweep generator, until the two "birdies" coincide.

f. With the r.f. network, mixer, and local oscillator all operating properly, any loss of signal must occur either in the antenna and lead-in wires, or else after the mixer. Leaving the u.h.f. sweep generator connected, use a crystal detector probe and trace the path of the signal from the output of the mixer through the v.h.f. or i.f. circuits.

Fig. 6. Schematic of the Mallory u.h.f. tuner, used in the converter of Fig. 1.



65

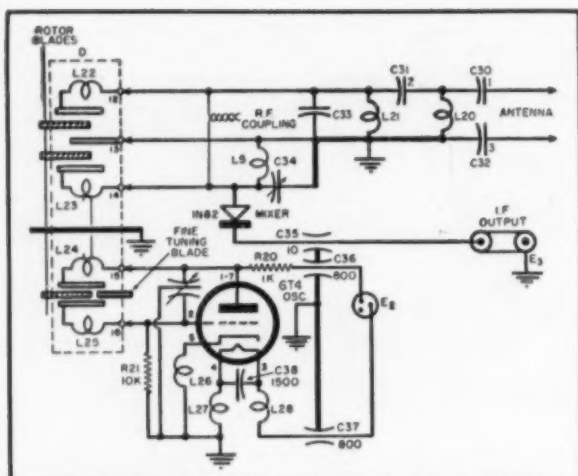


Fig. 7. Partial schematic diagram of the Standard Coil 82 channel turret tuner showing the u.h.f. portion and strip.

2. **Weak signals:** As mentioned previously, eliminate all other circuits as culprits before suspecting the u.h.f. tuner. It is best for this type of defect to bring the receiver to the shop where a good strong signal should be available and comparison with other sets possible. If it is definitely established that the loss of signal strength occurs in the u.h.f. tuner, the following steps are indicated.

- Measure oscillator plate and heater voltages.
- Replace the mixer crystal.
- Connect a u.h.f. sweep generator and oscilloscope to observe the bandpass of the r.f. network. Refer to the manufacturer's data for correct alignment instructions. If the r.f. and mixer networks are misaligned, considerable loss in sensitivity will occur. Where no exact alignment data is available, tune the bandpass for maximum amplitude at the weak station.
- The only remaining defect could be insufficient oscillator injection voltage. Try a new oscillator tube, then check the oscillator injection circuit. In some

tuners this is a 1- or 2- $\mu$ fd. condenser; in others a coupling loop or link is used. Replace the condenser or check the loop for an open connection. In order to check the operation of the oscillator injection network, the i.f. side of the mixer can be disconnected from its ground return and a milliammeter inserted. Crystal current due to the oscillator output should be between 0.1 and 1.5 ma.

3. **Intermittent:** One type of intermittent occurs on every channel and can be caused by tapping, squeezing, or jarring the tuner. Such a defect is due to a bad solder joint, or broken lead or component, and can invariably be located by mechanical inspection. The second type of intermittent occurs only at certain points in the band, especially when the tuning mechanism is used. From this description, noisy contacts, corroded wipers, or shorted condenser plates are probably the trouble. Again the defect can be repaired by simple mechanical means.

4. **Interference:** Many of the current u.h.f. tuners and converters radiate a considerable amount of their oscillator signals. Although interference between two receivers is rare in most u.h.f. areas because of the channel allocations and the higher i.f. frequencies, it is possible to run into this trouble. Some of the tuners operate the oscillator below the incoming signal, while others employ harmonics of the local oscillator. Interfering beats due to other u.h.f. equipment appear in the same manner on the screen as v.h.f. or i.f. interference. The remedies are the same; i.e., shielding of the offending tuner, orienting the antenna and transmission line for minimum interference and, as a last resort, relocating one or both antennas.

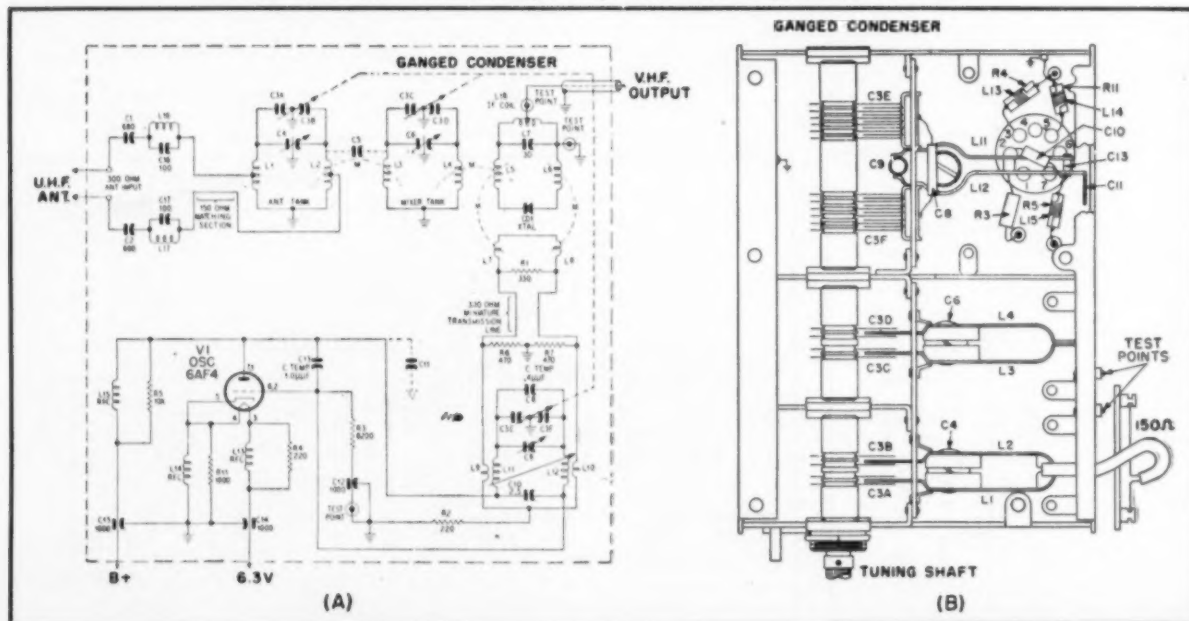
In addition to oscillator radiation, strong v.h.f. stations sometimes ride through the u.h.f. tuner and beat with the output of the u.h.f. section, or interfere directly as a superimposed picture. The only remedy for this is the use of an efficient high-pass filter in the input of the tuner and shielding of the u.h.f. network and the connection to the v.h.f. tuner, in the case of an external u.h.f. converter.

#### Typical U.H.F. Tuners

One of the widely used u.h.f. tuning mechanisms is the Mallory u.h.f. system which is found both in tuners and in external converters. The circuit diagram of the u.h.f. portion is shown in Fig. 6, and we can clearly distinguish the r.f. network, the mixer, and the oscillator circuits. The r.f. network is double tuned, one tuned circuit

(Continued on page 169)

Fig. 8. (A) Schematic diagram of the continuous u.h.f. tuner used by Philco in its TV receivers. (B) Bottom view of the tuner showing the ganged variable tuning condenser and the flat brass horseshoe-shaped strips which are the preselector tank coils.



# INEXPENSIVE APPLAUSE METER

By BASIL C. BARBEE

**F**REQUENTLY the radio or audio man is called upon by local service clubs to furnish an applause meter for the impartial judging of audience response to the efforts of hitherto undiscovered entertainers. Since these "talent shows" or "amateur contests" are always charity affairs, a professional-type applause meter, such as used on radio network "give-away" shows, is not justified.

All too frequently, the hastily lashed-up "applause meter" consists simply of a voltmeter clipped across the theater p.a. speaker line. This arrangement is highly unsatisfactory, for while the maximum level of each round of applause is read, an equally, if not more, important factor, the duration of the round, is guessed at or ignored altogether.

The applause of a single person consists essentially of a series of very short, highly damped bursts of sound, repeated at an average rate of about three per second. The amplitude and repetition rate of the bursts and the duration of the series of bursts, that is to say, the amplitude and total number of bursts, are functions of the enthusiasm of the applauding person. The applause of a group of persons consists of a number of these series, superimposed on each other with bursts scattered in almost random

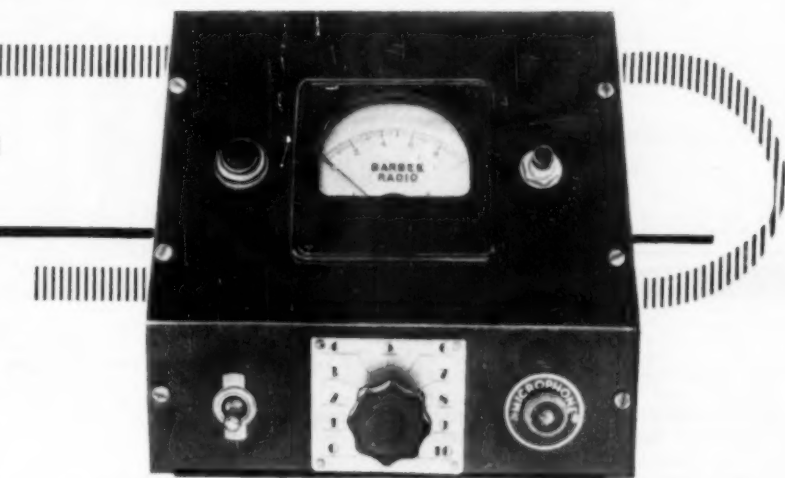


Fig. 1. Over-all view of the author's applause meter. This one was housed in an old v.t.v.m. cabinet but any other suitable housing could be substituted.

*Combine an audio amplifier, rectifier, and d.c. milliammeter into a weighted circuit for integrated indication of applause.*

fashion. The average pulse amplitude and the total number of bursts emitted are functions of audience enthusiasm. Both the amplitude and the number of bursts increase with increasing audience enthusiasm for the act being applauded.

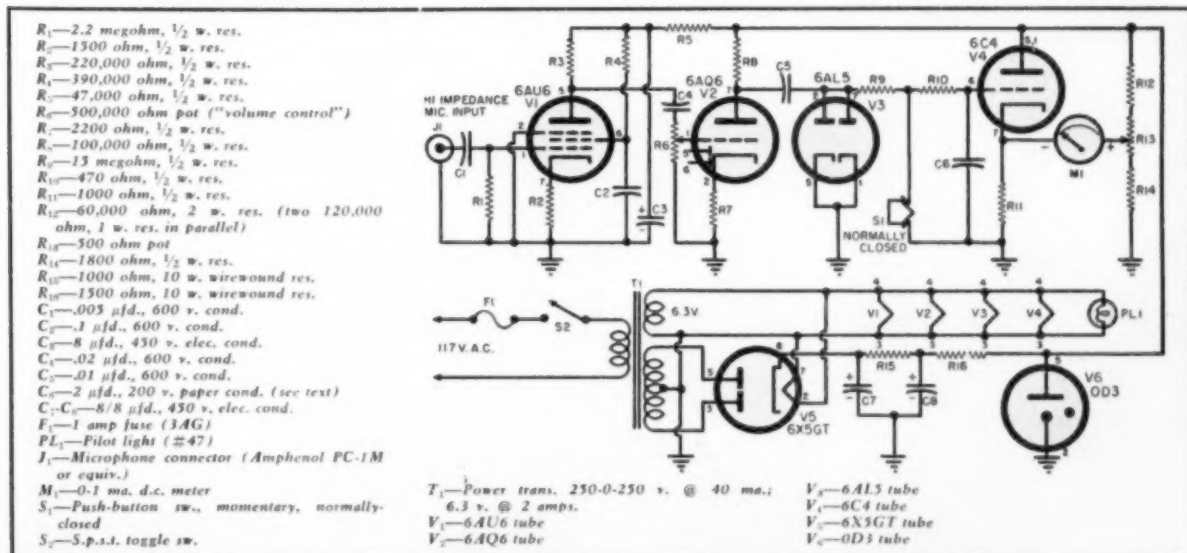
It may be seen from these considerations that measurement of the reaction of an audience in favor of an individual act may be approximated fairly well by integrating pulse amplitude with respect to time over the time interval of the duration of

the round of applause following that act.

Fortunately, this difficult-sounding mathematical operation may be accomplished quite simply by electronic means. The instrument shown in the photo, Fig. 1, was designed and built in about three hours. Probably another hour would have been spent punching the chassis except for the fact that the chassis and power-supply of a discarded v.t.v.m. were used. The unit incorporates a preamplifier

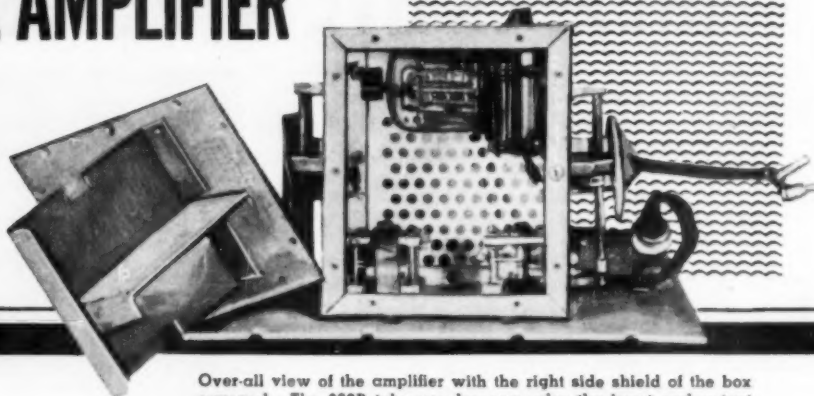
(Continued on page 158)

Fig. 2. Complete schematic diagram and parts list covering the applause meter. Standard parts are used throughout for ease of construction.



# A 220 MC. R.F. AMPLIFIER

By  
**LEROY W. MAY**  
WSAJG



Over-all view of the amplifier with the right side shield of the box removed. The 829B tube can be seen, also the input and output butterfly variable condensers. The ground strap of copper can be seen grounding the rotor of the output or plate butterfly. The shield isolates the tube from the butterflies and also shields between the butterflies which, in effect, shields the input and output circuits from each other and from the 829B tube.

**T**HE amplifier to be described is neither new nor original. It is just a smooth working 220 mc. r.f. amplifier that is free from parasitics or other undesirable side effects that quite often show up around these frequencies.

It was originally designed to be used with an *Amperex* AX9903 tube, but somehow the necessary nineteen bucks were never in one place at one time. Therefore, one of the old spare surplus 829B tubes, that we have had around for years on 144 mc., was used. It is anticipated that some day in the future one of the AX9903 bottles will move into the socket, replacing the old tired 829B that presently rents the space.

Tired or not, though, the 829B works very well in this amplifier. With an input of 80 watts unmodulated, the output, as estimated from observing a 60-watt lamp, could safely be said to be at least 55 watts. Under full modulation at this input, the 60-watt lamp will burn brighter than normal and if a sustained whistle is used, the bulb will turn

## *Construction details on a half-wave line amplifier which makes adequate power practical on the 220 megacycle band.*

blue and finally give up the ghost. At these frequencies, the lamp bulb test is none too accurate, but in the absence of some better way to measure the power output, almost everyone uses this method. Inputs up to 120 watts may be used with the 829B but a small fan is recommended for cooling under these conditions.

The 829B tube is rated in the tube manuals for full output to only 200 mc. How much derating should be made for the 220 mc. operation is not definitely known. One thing we found out for sure. It isn't as easy to get going on 220 mc. as on 144 mc. Now 220 mc. may not appear to be much higher than 144 mc. (actually it is

53%) but they don't list that 200 mc. maximum in the tube books for nothing.

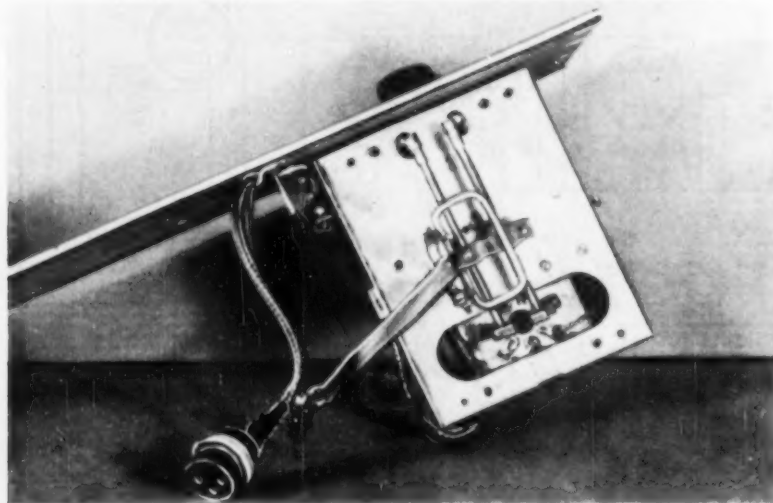
One thing that bothered us quite a bit when we started using the 829B on 220 was its high input capacitance of 14.5  $\mu\text{pfd}$ . This showed up in the form of an extremely small coil to resonate on 220 mc. Next, a quarter-wave shortened line was used. This helped some, but even then, a line that would tune looked pitifully short, and it was.

A lot had been heard about half-wave lines, but up until now they had hardly been needed. No particular trouble was encountered on 144 mc. with quarter-wave sections. Now, however, appeared to be an excellent time to start in on them and see if perhaps they might help in this situation.

Right off, it was found that half-wave lines would do the job. Enough line was available when the grid dipper indicated 220 mc. resonance to actually see and feel. After a little playing with the tube and some make-shift lines to ascertain the approximate length necessary, it was decided to go ahead and see if an amplifier could be built in a permanent fashion.

After a look in the stockroom (junkbox for lowbrows) we found a gadget that looked promising. This was the housing for the r.f. section of the old radar transmitter called the ASB-4. This thing used a gob of 15E's and had a mess of lines attached thereto. The box, which measured about 5x5x6 inches, had a couple of openings in the proposed top and bottom and a pair of cathode lines which appeared to be in the right position to engage the input and output prongs of an 829B tube. The

The input lines are shown in this photograph. The output lines are identical. The tube socket is visible through the cut-out. Other ends of the lines go through the openings in the box to the stators of the butterfly-type condenser units.



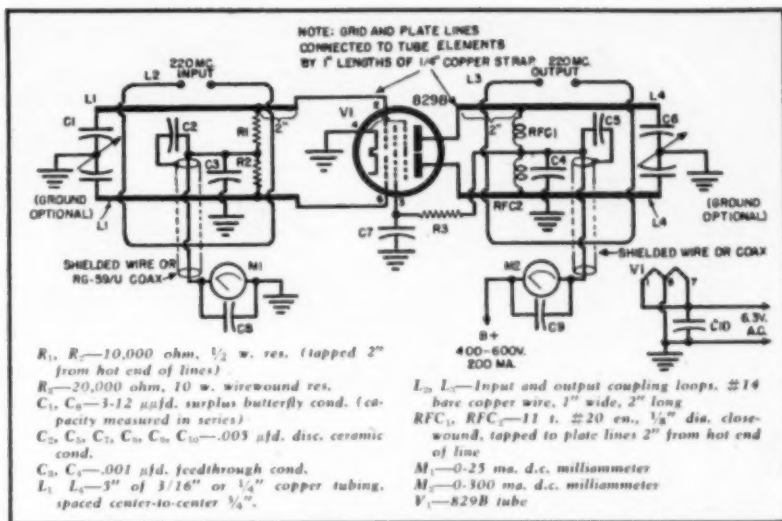
lines turned out to be just the right length after the tuning condensers were hooked on the ends of them and the construction was such that excellent isolation was obtained between the input and output circuits.

Now you might not have an ASB-4 around, but with a box of about the same dimensions and few inches of 3/16 or 1/4 inch copper tubing, you can duplicate the deal perfectly. In fact, it will probably beat this one for looks. One of the stock utility boxes with removable side covers will fill the bill.

A look at the photos and a few words will suffice to get this amplifier construction moving. The tube is mounted inside of the box with the socket jacked up off the chassis about half an inch. Four 1 1/2 inch machine screws with nuts will accomplish this. Immediately under the tube socket is the opening in the chassis that will allow the grid lines to be soldered to the grid lugs of the 829B socket.

Directly above the 829B tube will be seen the opening in the chassis that will allow the plate lines to be connected to the tube pins. Large size *Fahnestock* clips with pieces of soft copper strip about a quarter-inch wide are employed to connect to the plate lines.

The grid tuning condenser and the plate tuning condensers, which will be at the opposite ends of the pairs of lines, are mounted inside the box with their shafts running through the front. Thus, when a panel is mounted to the box, the tuning controls are accessible from the front. Clearance holes are drilled in the top and bottom of the box so that the lines may be connected to the stators of the tuning condensers. These are surplus butterfly-type condensers obtainable for around thirty-five cents each and mounted with 6/32 studs. The rotors are normally floating and, in the amplifier, it may be found that the operation is better with one or



Complete schematic diagram and parts list for the 220 megacycle r.f. amplifier.

both grounded. In our particular layout, it was found that a slight amount of hand capacity effect existed on the plate tuning condenser and grounding the rotor cured this. The grid condenser rotor was left floating. If it is found necessary to ground the rotor, use a wide piece of copper strip and bolt it down to the nearest place on the chassis.

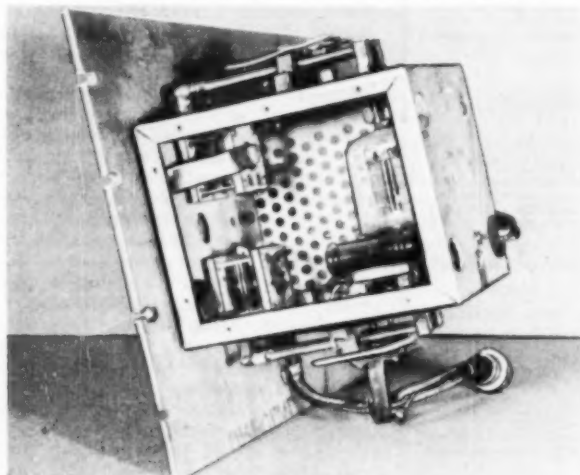
When using half-wave lines it becomes necessary to feed in the plate and grid voltages at a point of minimum r.f. voltage. This point is quite easy to find and may be done with the grid dip meter before applying power. Merely use a sharp-pointed lead pencil and touch the line along its length until you find a point where it has no effect or a minimum effect on the meter. As a check, after the amplifier is finished and fired up, the pencil may again be used, this time to look for minimum r.f. sparking at the pencil point. Home-made chokes

are used at this point to feed in the plate voltage to the plate lines, while the bias to the grid lines is fed in at the minimum r.f. point through a couple of 10,000 ohm, 1/2 watt resistors.

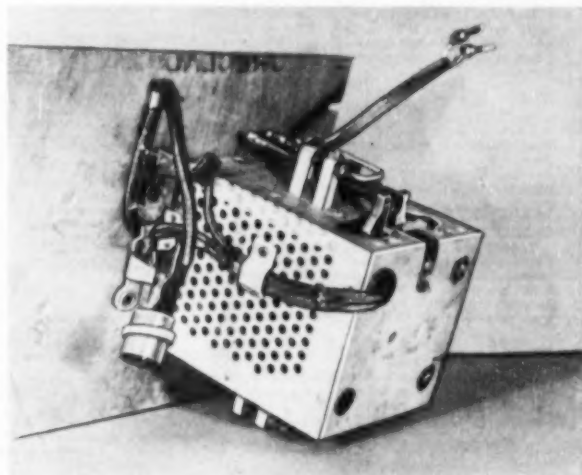
Output and input coupling loops consist of "hairpins" formed by No. 14 bare copper wire insulated with spaghetti, and are located at the minimum r.f. voltage points on the lines. A pair of ceramic pillars from BC-375E tuning units hold each one of these loops in place. Coupling to the input and output is adjusted by bending the loops in relation to the lines.

This amplifier was driven by a converted 522 transmitter operating on 220 mc. and more than enough drive is obtained. The final of the 522 was running about 22 watts input and 25 or 30 grid milliamps could be pumped into the 829B amplifier (Continued on page 118)

Another view of the r.f. amplifier with one side of the box removed to show the internal construction. The shield cover is not visible in this photograph. 829B may be seen at right.



Opposite side of the box. The ventilating holes are essential to aid in cooling the tube. The input lines are visible on top of the chassis and they terminate on ceramic pillars.



# Certified RECORD REVUE

By **BERT WHYTE**

**W**ITH this issue, the "Certified Record Revue" goes into the fourth month of its existence. Your response to our request for comments in the first issue has been immediate and enthusiastic.

We are frank to admit that we approached the idea of a record reviewing column in *RADIO & TELEVISION NEWS* with some trepidation. After all, there was no precedent for such a feature in a technical magazine. Your many, many letters have been a source of personal gratification to the author.

Your letters and the opinions and ideas expressed therein have been carefully screened with a view toward giving you what you want in this column. There were those who felt that more attention should be given to the musical values of the record-

ings and others who want a more technical critique than is now being offered. In the main, most of you who wrote wanted the present balance of technical evaluation and musico-esthetic considerations to be maintained.

On two points there was almost complete unanimity of opinion: one, the naming of the equipment used in reviewing the records and two, the comparative analysis of different recordings of the same musical work. Both practices will be continued, in fact, with the next issue comparative reviews of recordings old and new will be incorporated in this column.

Keep those letters coming in and I'll do my level best to try and make everyone happy. Since by the time you read this column Christmas will be upon us, let me take this opportunity of wishing you a Merry Christ-

mas and a year of happy listening.

Equipment used this month: *Pickering* 260 pickup, *Fisher* master audio control, *McIntosh* 30-watt amplifier, *Jensen* G610 "Triaxial" in the "Read Fold-a-flex" enclosure.

## BEETHOVEN

**SYMPHONY #5 in C, EGMONT, CORIOLAN, AND LEONORE #3 OVERTURES**

Minneapolis Symphony Orchestra conducted by Antal Dorati. Mercury "Olympian Series" MG 50017. AES curve. Price \$5.95.

**SYMPHONY #5 IN C, SYMPHONY #8**

NBC Symphony Orchestra conducted by Arturo Toscanini. Victor LM 1757. Orthophonic curve. Price \$5.72.

What! This old chestnut again? And *two* recordings at that, I can hear you exclaim. OK, so this warhorse among warhorses has been done for the 14th and 15th times. You may ask why, with good reason. How come *Victor* and *Mercury* are trying to buck the competition of thirteen other versions? Are they really necessary? My answer is yes, and I consider their issue a tribute to the respective musical directors of *Victor* and *Mercury*. Both these worthy gentlemen had the courage to release these recordings on the premise that they were *needed*, that none of the previous recordings were totally satisfactory. I heartily concur, with some reservation. This reservation lies within the nature of Beethoven's 5th itself. I don't think *any* recording, or for that matter concert performance of this symphony can be *totally* satisfactory. The temptation for conductorial interpretive "tampering" is too great, the discipline demanded of the orchestra formidable indeed. However, this is merely academic. Let us take a listen to these latest entries and find this justification of which I speak.

Beethoven 5th is the work that will be herein reviewed, as you have surmised from the above. The other works should come in for more attention, but alas, space is always at a premium. Suffice to say that the three great overtures have never been afforded such fabulous recording. With the drive and spirit that Dorati imbues in his reading of them, these little jewels of Beethoven's genius become more sparkling and scintillant than ever. Toscanini's reading of the 8th symphony is somewhat restrained for him, but nevertheless must be considered the best on records at present.

In the Beethoven 5th we find *Victor* and *Mercury* on opposite sides of the fence with their respective recording techniques. *Mercury*, having considerable success with their single-*Tel-efunken*-over-the-podium pickup, uses it again in this recording, with stunning effect. *Victor* is sticking by its guns and continues the multi-mike, console mix type of recording. The result in both cases, is that we now have two of the best sounding Bee-

(Continued on page 136)

Capsule reviews of records old and new for your Christmas gift-giving.

**AURIC**—Suite from Les Mamelots

**SATIE**—Parade

Columbia ML 2112, 10" LP

Modern, jazzy type of thing with some amusing writing. Excellent sound and performance.

**BARTOK**—Third Piano Concerto

Columbia ML 4239, 12" LP

The last work of this genius and one of his most listenable. Dissonance, atonality, it's all here, but very interesting. Good sound.

**BARTOK**—Music for Strings, etc.

Mercury MG 50001, 12" LP

A tremendously powerful work. Might have to listen to it a couple of times before you begin to appreciate it, but it's worth your time. A top recording excellent for transients.

**BERG**—Wozzeck

Columbia SL 118, two 12" LP

Another hard one to love at first hearing. This awesome tale, once understood and digested, can be a terrific listening experience. Great performance and some wonderful sound.

**BERNSTEIN**—Age of Anxiety

Columbia ML 4325, 12" LP

This is the second symphony of Leonard Bernstein, "enfant terrible" of modern American music. It's pretty deep stuff, even a little grim, but nevertheless fascinating. Try section entitled the "Masque." Jazzy figures and all sorts of good transients.

**DEBUSSY**—Le Martyre de St. Sebastien

Allegro All 3004, 12" LP

Little known work of Debussy, this is beautiful, grandiose music, gorgeous solo, choral, and orchestral effects. Definitely recommended.

**HINDEMITH**—Philharmonic Concerto and Apparebit Repentina Eles

Capitol P8134, 12" LP

The opening brass chords in the "Apparebit" are worth the price of the record. Huge sonority. Massive orchestration in the concerto and near the end a wonderful bit of writing for trio. Good sound.

**HONEGGER**—Concerto da Camera

Capitol P 8134, 12" LP

Some spritely, interesting writing for flute and English horn. Very good playing and some of the best woodwind reproduction on records.

**KODALY**—Missa Brevis

WCFM, four 12" LP

Modern treatment of a Mass in time of war. Tremendously rich in scoring and with some low, low organ pipes to test your speaker.

**MILHAUD**—Creation du Monde

Columbia ML 2203, 10" LP

Man, this is red hot! About the jazziest modern in existence. Wonderful performance and plenty of hi-fi.

**NIELSEN**—Symphony #6

Mercury 10137, 12" LP

One of Denmark's foremost symphonists, this is among his most interesting works. Highly dramatic with a slightly astringent flavor. Magnificent sound especially in the movement called "Burlesque."

**SCHONBERG**—Gurrelieder: Lied der Waldaube

Columbia ML 2140, 10" LP

To those of you who think Schonberg nothing but atonality and discord, listen to this. A truly beautiful and poignant work. Fine performance and excellent sound.

**SCHUMAN, WM.**—Judith and Undertow Ballet Suites

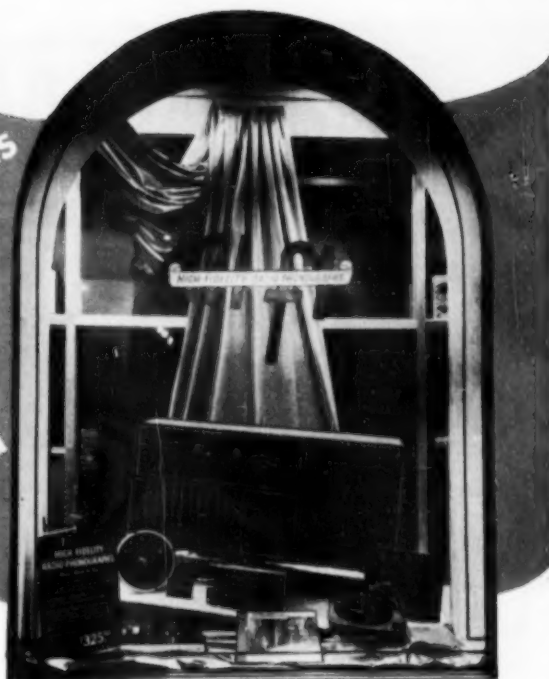
Mercury 10088, 12" LP

Two powerfully written and blood-curdling ballets. There is plenty of hi-fi pyrotechnics in these two!

# Music IN EVERY HOME

*Christmas is Coming!*

*The holiday gift-giving season opens up a lucrative market for the audio dealer. Be ready to cash in on these opportunities.*



Carl Fischer, Inc., New York Music house, promotes the sale of hi-fi gear with this effective display.

**T**HE AGE of high fidelity is upon us and the buying spirit of Christmas will undoubtedly climax a period of unexcelled consumer promotion. No longer can we conclude that high-fidelity merchandise is only for the technician and audio enthusiast. The breadth of the market has changed; everyone who stops to listen is a potential customer.

Today more and more dealers are aiming their sales stories at the general consumer. From the window to the counter the merchandising story of high fidelity has taken its place with the promotion of leading music products. No longer does the dealer have to translate the meaning behind "high fidelity." The average consumer today is constantly on the receiving end of hi-fi indoctrination, either through the editorial text of leading national magazines or through the stepped-up advertising campaigns of manufacturers.

High-fidelity dealers of all varieties have within their grasp the tremendous opportunity of placing music at its best within every home. However certain selling patterns have to be compromised to reach this new opening market. The very fact that it is the home magazines which are the recipients of the largest space advertising is indicative of the trend of thinking of the manufacturer. Add to this the editorial emphasis given music in the home by these very same magazines. In short the place of high fidelity in the home is related to better living within the home. The design trends point up the importance of interior selling in the general hi-fi sales story.

There is every indication that the market of tomorrow is a non-technical one. The customer, a majority of whom will be women, is anxious to see as well as hear. Therefore the very element of the dealer's surroundings will be most important in the production of greater sales. The customer's interest should be considered first—show him what he likes to see; make him comfortable; above all don't try to make his decision.

The volume customer of high fidelity this Christmas will be a far different breed than that which the dealer has previously faced. No longer shall he be registered as a "bug"; rather he should be considered as one of many who value good listening. The technical circuitry is only of

interest as it relates to what he hears. Sure, just as the early television purchaser, he will consider himself one of the chosen few and high-fidelity ownership will be noted with pride. He will discuss with his neighbors the advantages of owning a high-fidelity unit as if he were an authority on reproduction. That of course will be the greatest factor in the development of increased sales . . . the germ of the "have's" will affect the "have-not's" and before long the term "high fidelity" will become almost as popular a subject of conversation as early television.

One point should be constantly kept in mind—the customer views audio components not as complete entities within themselves but rather as parts of a complicated mechanism. Therefore, in evaluating a program of component selling, one must be aware that although plugging one component into another is a simple matter the purchaser prefers that you make the assembly.

It should never be forgotten that the growing consumer market thinks in terms of the good "old" radio-phonograph and, as such, he thinks in terms of a complete package. To take the complexities out of high-fidelity selling, it would be desirable to de-emphasize the switching console. The average consumer watching the varied paraphernalia put to use likes to get back to the common "off-on" knob. The onlooker is beset with confusion at the variety of equipment, the wiring, and the lights that intermittently flash "on" and "off." Consider the uninitiated as you would a backward child, broaden his perspective through association. Set up working systems within consoles and have comparisons made through simple known controls. This system has presently been adapted in the recently opened outlets of *Electronic Workshop* and *Sun Radio*, both in New York City.

As a dealer in audio products, you are faced with an entirely new breed of customers. They will be more frequent and less demanding technically. They want to buy what they can see as well as hear. At times their innocence may seem insufferable; but patience, fortitude, and good consumer merchandising will pay more than adequate dividends. This Christmas can be a "green" one for hi-fi dealers with the cash registers playing "Jingle Bells" all day long.

-50-

# Mac's RADIO SERVICE SHOP

By JOHN T. FRYE



## TV RECEPTION AND NOISE

**A**S MAC stepped briskly inside his service shop, glad to be out of the cold December drizzle, he heard his assistant, Barney, reading aloud to Miss Perkins, the office girl, an item from the morning paper:

"And the meeting of the noise-abatement group was addressed by Mr. McGregor, local radio and TV service shop owner, on some of the technical aspects of noise generation and its effect on local television reception—Hey, how about that?" the youth broke off as he saw his employer. "Why didn't you tell me you were going to talk? I'd like to have been there."

"It was bad enough as it was," Mac answered as he shrugged out of his overcoat. "You know how hard it is for me to try to make any kind of a public speech anyway; and if I had had to look at your grinning mug out front, I'd never have been able to say a word."

"How did you get roped in on the deal?"

"Harold, over at the bank, asked me to make the talk. He had been instrumental in getting things rolling on this 'better television' group in the first place; but he said things were beginning to get a little out of hand. What had started out to be an investigation of the possibilities of improving reception was rapidly deteriorating into a witch hunt. Extremists in the group were determined to 'do something' about poor reception. Some were in favor of 'ordering' an FCC truck into the area to make a noise survey. Others wanted to deliver an ultimatum to the mayor and city council either to clean up receiving conditions 'or else.' Still others were drafting proposed city ordinances for-

bidding the use of any device whatever that disturbed television reception. Harold thought that if I could present a few facts and figures on local signal strength, noise measurement, FCC policy, and so on, it might help to cool things off a little. Otherwise, he said he had nightmares of himself being pushed along at the head of a French Revolution kind of mob marching on the City Building."

Barney chuckled at this picture and then went on to ask, "Did you cool things off any?"

"I don't know. They had a discussion period before my talk that gave me a good idea of how they were thinking. Most of them were convinced that noise in our town was way above normal and that this abnormally high noise level was what stood between us and good television reception. What I tried to do was point out as tactfully as I could the things that should not be done because they would just be a waste of time. For example, I explained that the Federal Communications Commission does not provide a service for making noise surveys. They do have mobile units used for locating unauthorized radio stations and interference sources using radio frequency energy, but unless the interference is to a radio service involving safety of life and property, investigations are normally conducted only during periodic inspection trips to an area."

"Strictly speaking, we are not supposed to be receiving television here, anyway, are we?" Barney asked.

"That's right. The closest v.h.f. station is seventy miles away, and the next closest is better than a hundred. On top of that we are located down in a river valley that averages fifty to

seventy-five feet below the surrounding terrain. Our average at-the-set signal strength delivered by a yagi antenna fifty feet in the air is around five to ten microvolts as measured with our service-type field strength meter. Sometimes, with a good thermal inversion, this will climb to two or three thousand microvolts; but these times are rare. They only serve to make people wonder why reception can't be like that all the time. As the signal grows weaker, the noise comes up in the sound along with snow in the picture; and that provides many people with the answer: noise is the villain. If it were not for excessive noise, they reason, good reception could be had all the time."

"How did you go about talking them out of that idea?"

"I tried to explain what the FCC considers necessary in the way of signal strength for good reception, and I'm afraid I got a little too technical there. I told them that the basic unit of measuring field strength is the one microvolt of potential that is developed in a conductor exactly one meter long by the magnetic flux of a radiated wave of the proper strength sweeping across it. Waves that are weaker or stronger are expressed as so many 'times'—decibels to us—below or above this basic strength of one microvolt-per-meter. This measured voltage, of course, is that actually produced in our standard antenna proper mounted in free space; it is not the voltage delivered to the set."

"Never mind simplifying things from here on in," Barney said. "You've got me interested now. How much signal does the FCC say we need?"

"Depends somewhat upon where you live. They list two grades of service: A and B. Grade A service is intended to provide reception quality acceptable to a median observer— whoever that is!—at least 90 percent of the time at the best 70 percent of the receiver locations at the outer limits of the service. The receiving antenna is to be a half-wave dipole for channels 2-13 and an antenna with 8 db gain on channels 14-83. The lead-in is figured as being fifty feet of 300 ohm twin-lead. It is assumed that urban noise conditions will prevail that will contribute all the way from 0 to 14 db of noise. Under these circumstances, the FCC specifies a minimum of 68 db above 1 microvolt-per-meter on channels 2-6, 71 db on channels 7-13, and 74 db on channels 14-83."

Barney hauled down Terman's "Radio Engineering" and turned to the db tables in the back. "Let's see now," he mused. "That would mean we need about 2500 microvolts on the low v.h.f. channels, 3300 microvolts on the high channels, and around 5000 microvolts on the u.h.f. channels."

"That sounds reasonably close," Mac agreed. "Grade B service is figured to provide quality acceptable to our mythical median observer 90 percent."

(Continued on page 176)

# KNOW YOUR 1954 WESTINGHOUSE TV RECEIVERS

By  
**W. L. WRIGHT**  
TV-Radio Service Dept.  
Westinghouse Electric Corp.

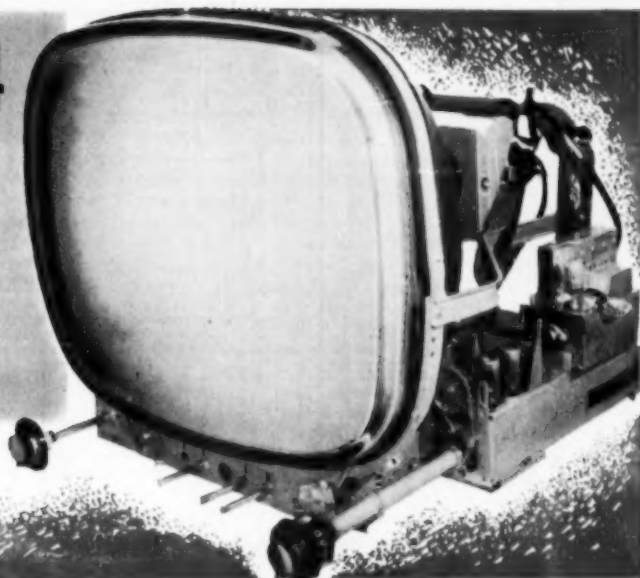


Fig. 1. The V-2243-1 chassis shown with the Model H-904 all-channel u.h.f. tuner mounted above and to the rear of the v.h.f. tuner.

INCORPORATED in the new Westinghouse television receivers (Models 769T21, 770T21, 771T21, 772K21, 773K21, 774K21, 775K21, 776K21, 786K21, and 787K21) are many design features of particular interest to the television technician. In addition to a simplified sound circuit, an improved sync system, and unique provisions for the installation of an all-channel u.h.f. tuner, the entire chassis layout has been designed for easy servicing. Other new features include relocation of the auxiliary operating controls, addition of an a.g.c. control on the rear of the chassis, improved width and horizontal linearity controls, easily adjustable yoke mount, and a removable safety glass.

For operating convenience, the horizontal hold, vertical hold, and brightness controls are located behind a hinged panel attached to the receiver cabinet. These controls are equipped with small rubber knobs to facilitate adjustment. The channel selector and fine tuning control for both v.h.f. and u.h.f. remain in the usual position on the right-hand side of the chassis (see Fig. 1). The dual "off-on-volume" and picture control are located on the left-hand side of the chassis. The addition of an a.g.c. control on the rear provides for receiver sensitivity adjustment to compensate for signal conditions in different locations and variations in i.f. amplifier tube characteristics. Slider type width and horizontal linearity controls are located on the right rear of the chassis for ease of adjustment. Other service adjustments located on the rear of the chassis are the height, vertical linearity, focus control and the quieting control (see Fig. 5). The deflection yoke mounting bracket has been redesigned to provide free movement of the deflection yoke while it is being positioned and to insure that the CRT cushion firmly supports the flare on the CRT. The front glass plate can be removed for cleaning without removing the

chassis from the cabinet. Four  $\frac{1}{4}$ " self-tapping screws hold the control panel to the cabinet. Removing the control panel exposes the mounting bracket that secures the front glass to the cabinet.

## New Sound System

Simplification of the sound system in the new line of Westinghouse TV receivers is achieved by the use of a 6BN6 gated-beam tube as the FM detector and a 6BK5 beam-power pentode as the audio output amplifier. The limiter (control) grid of the 6BN6 is capable of changing plate current from cut-off to saturation with only a small input signal, therefore only one sound i.f. amplifier stage is required to drive the 6BN6. The relatively high audio output voltage of the 6BN6 in conjunction with the high power sensitivity of the 6BK5 eliminates the need for an intermediate audio amplifier.

Use of the 6BN6 gated-beam tube as an FM detector eliminates the need for limiter stages. A signal voltage of 1.25 volts r.m.s. at the limiter grid of the 6BN6 is sufficient to drive the tube from cut-off to saturation. When the tube current is at the saturation level, higher inputs cannot increase the plate current. Therefore, amplitude limiting occurs when the signal voltage at the limiter grid exceeds 1.25 volts r.m.s., making the detector insensitive to amplitude fluctuations (AM). To obtain these conditions, the control grid bias on the tube must be set at the point where

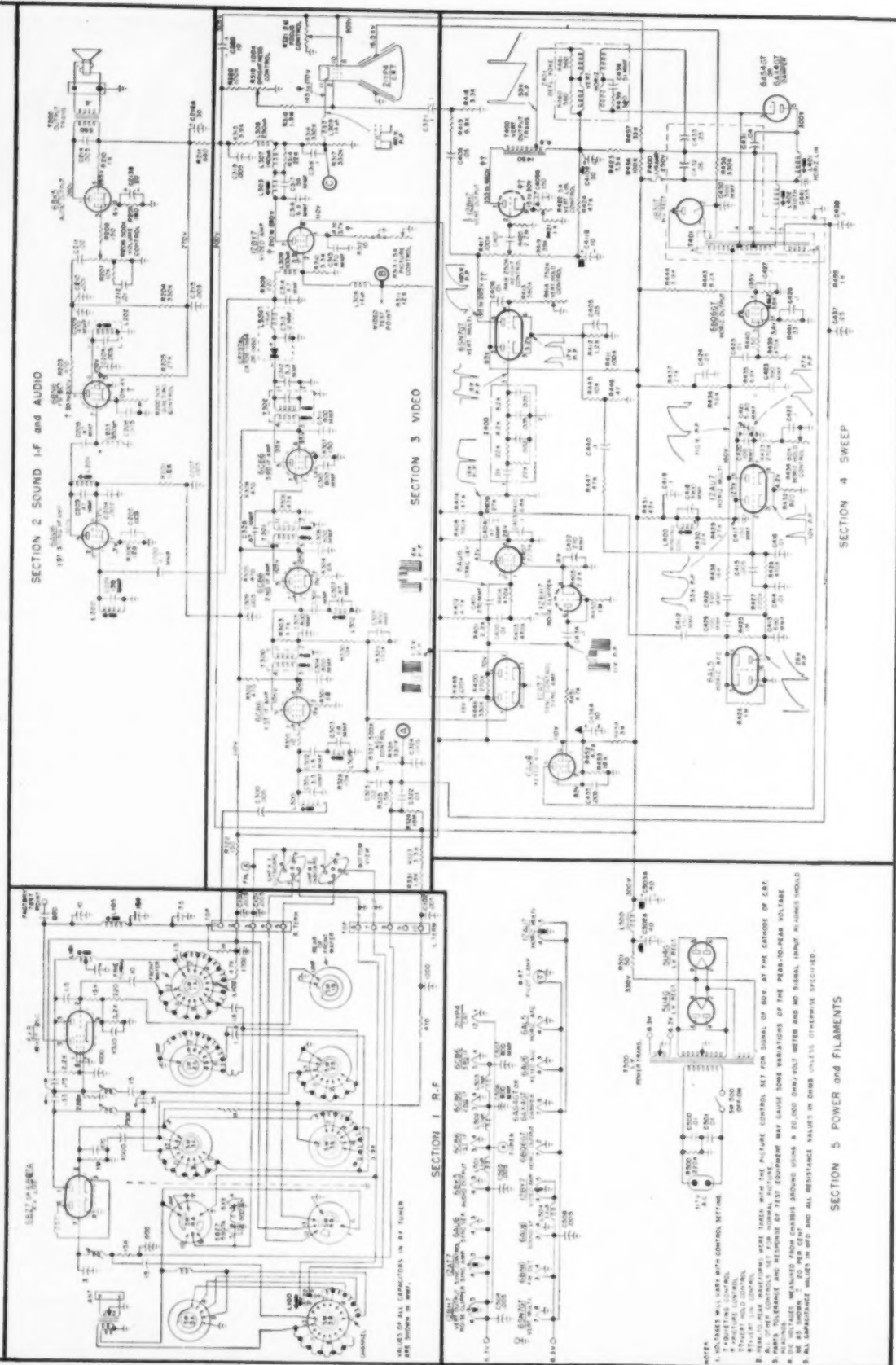
the tube operates in the correct portion of its characteristic curve. The cathode resistor (quieting control, see Fig. 2) is variable so that the AM-rejection characteristics can be adjusted for optimum performance during alignment of the receiver sound circuits.

## New Sync System

The new sync system insures maximum effectiveness over a wide range of input signals and a high degree of noise immunity. As shown in Fig. 2, direct coupling is employed between the video detector and the sync amplifier grid (through  $L_{ms}$  and  $R_{ms}$ ). On strong signals a negative bias voltage is developed across the video amplifier grid resistor,  $R_{ms}$ , and tends to appear on the grid of the sync amplifier as a result of the direct coupling. If the sync amplifier grid was allowed to remain at a negative potential, the incoming sync pulses (which are negative going) would drive the sync amplifier tube considerably beyond cut-off, causing the sync pulses to be compressed. To prevent this undesirable condition, a positive potential is applied to the grid of the sync amplifier through the voltage divider network,  $R_{ms}$ ,  $R_{ms}$ ,  $L_{ms}$ , and  $R_{ms}$ .

The action of the sync control tube now becomes important. The full a.g.c. voltage developed by the receiver is applied to the grid of the sync control tube. Strong signals develop a high negative a.g.c. voltage which is sufficient to cut off the conduction in the sync control tube.

Fig. 2. Complete schematic diagram of the Westinghouse V-2243-1 television chassis including the v.h.f. tuner.



Therefore, under strong signal conditions the sync control tube represents an open circuit and allows the positive potential on the grid of the sync amplifier tube to remain at the level determined by the divider network.

On weak signals, the a.g.c. voltage is low enough to allow the sync control tube to conduct. When the sync control tube conducts, it represents a relatively low resistance between ground and the junction of  $R_{100}$ ,  $R_{101}$ , and  $R_{102}$ . Under these conditions, application of a positive potential to the grid of the sync amplifier tube is prevented. A positive potential at the grid of the sync amplifier on weak signals is not desirable because cathode-to-grid conduction in the sync amplifier would result in a low input impedance with an accompanying loss of signal voltage.

The control tube, in effect, is a variable in the voltage divider network which determines the potential on the grid of the sync amplifier. Thus, opti-

mum bias is automatically applied to the sync amplifier over the full range of signal input levels.

One-half of a 12BH7 tube, with the plate and grid connected together to form a diode, serves as the noise clipper. The positive-going pulses at the plate of the sync amplifier are fed to the plate of the noise clipper via a .1  $\mu$ fd. condenser,  $C_{101}$ . When a positive pulse is applied to its plate, the noise clipper conducts causing  $C_{101}$  to charge. After the pulse passes,  $C_{101}$  discharges slowly through the one megohm resistor  $R_{101}$ , thereby applying a negative potential to the plate of the clipper. Since the discharge time constant of  $C_{101}$  and  $R_{101}$  is long when compared to the time between pulses, the negative potential is maintained at the plate of the clipper. Therefore, the clipper conducts only slightly during the succeeding sync pulses. The current during conduction of the clipper flows through  $R_{101}$ , developing a positive voltage at the

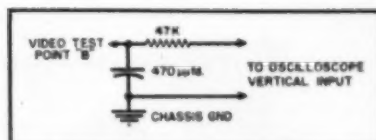
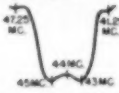


Fig. 3. Decoupling network used with oscilloscope in step 1 of Table 1.

cathode of the clipper. Because the negative potential at the plate of the clipper allows conduction on only the peaks of the sync pulses, the voltage developed across  $R_{101}$  is very small and is present only when sync pulses are present.

When noise pulses having an amplitude greater than that of the sync pulses appear at the plate of the clipper, the negative potential at the plate of the clipper is overcome and the clipper conducts heavily. This develops a spike of positive voltage corresponding to the noise pulse across  $R_{101}$ , which is also the sync separator

Table 1. Alignment procedure covering the video i.f. and sound circuits of the Westinghouse V-2243-1 television chassis.

VIDEO I. F. ALIGNMENT						
STEP	SIGNAL GENERATOR FREQUENCY	CONNECT TO	OUTPUT INDICATOR	CONNECT TO	ADJUST	REMARKS
1	44 mc. center frequency 10 mc. sweep	Pin 1 of 3rd i.f. amplifier (6CB6)	Oscilloscope	Video test point "B" (see Fig. 5) through the de- coupling net- work shown in Fig. 3	T <sub>102</sub> primary (top) for maximum pat- tern height. T <sub>102</sub> secondary (bottom) for symmetrical response curve	Connect detuning alligator clips to 1st and 2nd i.f. plates (pin 5).
2	47.25 mc. unmodulated	Pin 1 of 1st i.f. amplifier	Oscilloscope	Same as above	L <sub>107</sub> for minimum response	Remove detuning clips
3	44 mc. center frequency 10 mc. sweep	Pin 1 of 2nd i.f. amplifier	Oscilloscope	Same as above	T <sub>201</sub> primary for maximum height. T <sub>201</sub> secondary for symmetrical curve	Connect detuning alligator clip to 1st i.f. plate
4	44 mc. center frequency 10 mc. sweep	Pin 1 of 1st i.f. amplifier	Oscilloscope	Same as above	T <sub>300</sub> primary for maximum pattern height. T <sub>300</sub> second- ary for symmetrical curve. L <sub>103</sub> for "hump" at 44 mc.	Detune L <sub>103</sub> before adjusting T <sub>300</sub>
5	213 mc. center frequency 10 mc. sweep  41.25 mc. unmodulated marker	Antenna termi- nals through a matching net- work. Pin 1 of 1st i.f. amplifier	Oscilloscope	Same as above	L <sub>200</sub> for curve below. L <sub>201</sub> for minimum 41.25 mc. marker amplitude 	Replace 6BZ7. Set fine tuning adjustment to mid-range
6	4.5 mc. unmodulated	Video test point "B" through .001- $\mu$ fd. condenser	V.T.V.M.	Test point "C" through r.f. probe	L <sub>202</sub> for minimum	Use strong signal from generator
SOUND I. F. ALIGNMENT						
7	4.5 mc. FM. 7.5 kc. devia- tion or tune in local TV station	Test point "B"	V.T.V.M.	Across R <sub>206</sub> (volume control)	L <sub>201a</sub> , L <sub>201b</sub> for maximum	Use a weak signal
8			V.T.V.M.	Same as above	L <sub>202</sub> for maximum	Use a strong signal
9	4.5 mc. AM	Test point "B"	V.T.V.M.	Same as above	R <sub>202</sub> for minimum	



# A PLUG-IN MODULATOR

By EVERETT G. TAYLOR, W8NAF

THIS article describes a simple "clamp modulator" that may be plugged into any available c.w. transmitter to permit phone operation. It should prove attractive to the code operator if he wishes to operate phone without having the operating position cluttered up with the usual amount of modulator equipment.

It is a well-known fact that a clamp modulator will not permit the class "C" stage being modulated to operate as efficiently as some other types of modulation but it is an inexpensive way of modulating a c.w. transmitter. Properly adjusted, it has good speech quality and is easily read by the operator receiving the signal.

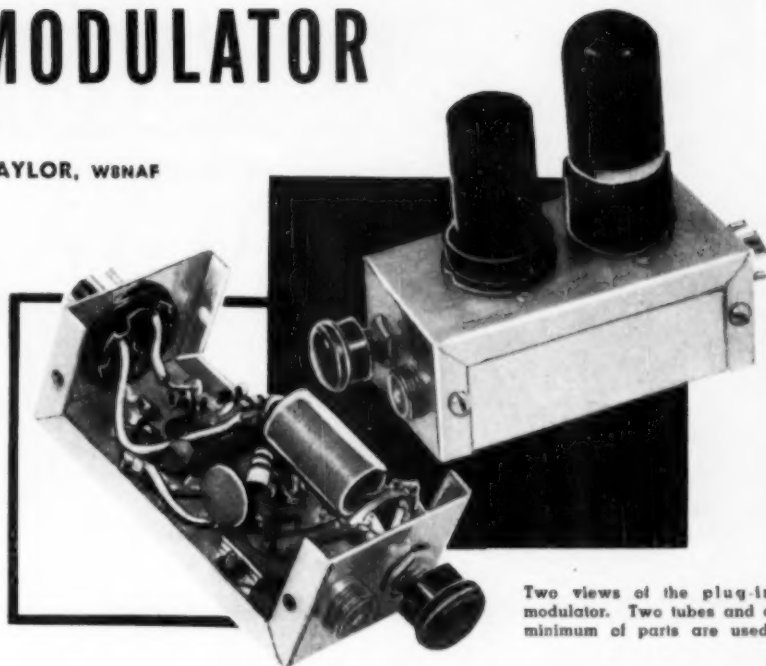
This little packaged unit is simple and easy to construct. It uses few parts and is inexpensive to build. It is designed to plug into an octal socket on the rear of the chassis of any c. w. transmitter with the filament and "B" voltages being supplied through the plug-in octal socket. It may be used to modulate an 807, 2E26, or practically any beam power type of final. It may also be used to modulate the SCR-274-N series of transmitters, which is one of the more popular pieces of surplus equipment in use on the medium frequency ham bands.

The parts are mounted on an ICA 29337 "Flexi-Mount" aluminum case. Only two tubes are used, namely, a 6SH7 as a speech amplifier and a 6U6 as the modulator tube. A 6AU6 may be used in place of the 6SH7 if further miniaturization is required.

The external parts are mounted as follows: the tube sockets are placed on top of the chassis and the mike input and gain control are mounted on the front while the male octal plug is placed on the back.

The internal components are almost all mounted point-to-point therefore only a small amount of hook-up wire is required. An Amphenol 75-CL-PC1M microphone connector is used for the mike input. The gain control,  $R_1$ , is a 500,000 ohm Centralab type "R" unit. The sockets for the tubes are Cinch type 8EM. The male socket connecting the modulator to the transmitter chassis is an Amphenol type 86-CP8. The remainder of the resistors and condensers are of the common USA-manufactured variety.

$C_1$  is used to isolate, d. c.-wise, the gain control from the 2.7 megohm resistor which supplies the bias to the 6SH7. The reason for this condenser is that if you use a dynamic type of microphone, the d. c. resistance of the



Two views of the plug-in modulator. Two tubes and a minimum of parts are used.

*A compact clamp-tube circuit which can be used to transform any c.w. transmitter into a phone rig neatly and efficiently.*

secondary of the input transformer would effectively short out the bias to the input tube.

The values specified for  $R_1$ ,  $C_1$ , and  $R_2$  should remain unaltered as they are correct for voice frequencies between 300 and 2500 cycles. This combination of parts will give more pronounced modulation.

The choice of the modulator tube, the 6U6, was dictated by the fact that its plate voltage more nearly ap-

proaches the needed value of the screen voltage of the tubes, mentioned earlier, which it modulates.

When modulating a 2E26 or 807, the screen should be reduced to about 100 volts or so by increasing the value of the screen dropping resistor. This resistor is common with the screen of the pentode being modulated and likewise with the plate and screen of the 6U6.

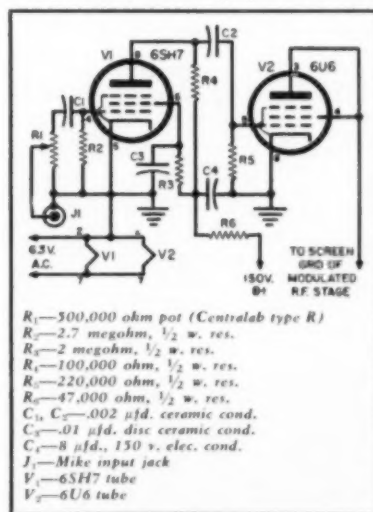
During the process of modulation, the screen of the r. f. tube will vary at an audio rate which is determined by the mode of the audio signal applied to the screen of the r. f. tube.

Just a word of caution, the screen bypass condenser in the circuit of the r. f. tube being modulated should not exceed .002 microfarads. If it is any larger, it will bypass the audio component, particularly at the high-frequency end. This would result in a signal sound level that is much lower in amplitude than desired and an apparently greater bass response.

The 150 volts for the 6SH7 circuit may be obtained from a VR-150 which should be used to supply the voltage needed in case you use a v.f.o. in the r. f. portion of the transmitter.

We feel sure that you will be pleased with this little modulator as it is quite versatile. The basic idea of the clamp-tube has been used by a number of hams in both mobile and home operation. It saves weight, size, and money if you are interested in an occasional phone contact.

Complete schematic of plug-in modulator.



# The ELECTRONORGAN

By  
**RICHARD H. DORF**  
Audio Consultant



Fig. 14. Close-up view of some of the stops.

## Part 2. Selecting a suitable console to house the organ and details on the necessary conversion. Construction data on the plugboard and the organ's key switches.

THE console or housing for the "Electronorgan" will determine, to a large extent, the physical layout of the electronic parts. The writer's console, shown in Fig. 1 (Part 1), is a standard pipe-organ unit purchased from an organ repairman. Organ repairmen or builders can be found in every good-sized city and they almost always have, or can locate, a suitable

console. Agencies for electric and electronic organs are also good bets, since when a church or organization installs a new electronic unit, the seller is often given the job of removing and disposing of the old organ.

For convenience and the least number of alterations, the console selected should have certain basic features. It should, of course, have two manuals

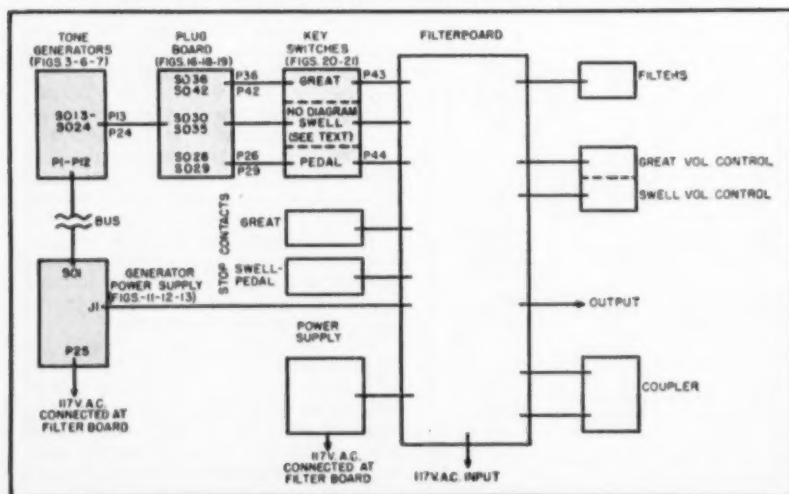
(unless the constructor will be satisfied with one—musically not nearly so satisfactory) and the manuals should be in good condition as far as the action is concerned. The ivories can be badly chewed up, for they are easily replaced with either pieces of "ivory" sold for the purpose or ivories salvaged from discarded manual.

The console should also include a pedal clavier in good condition. Good condition is, of course, a relative term and ingenious constructors can readily repair actions in almost any state of disrepair short of actual or incipient disintegration. Fifty to sixty dollars is about the maximum price you should have to pay for a console, depending on condition and elaborateness.

Since the organ will have to have at least one swell shoe (expression pedal) the console should have one in such condition that it at least pivots freely. Two pedals are more satisfactory. Stop and coupler controls exist on all organ consoles but the buyer should make sure either that the number of controls is sufficient or that additional ones can be added without making a hodgepodge of the final product. The actual contacts may or may not be in working order just as long as the mechanical actions are intact. Try to get a pipe-organ console rather than one from a reed organ, since the latter will be unnecessarily bulky. Also make sure that whatever console is selected can be disassembled so that it can be moved around.

The following description of the writer's console is given merely as a guide and an example. The case itself is 60½ inches wide and 48½ inches high by 24 inches deep. It is a plain box. Originally it contained eight pneumatic pistons on the floor of the box for the adjustable stop combinations, but these were removed. The remaining case was a simple box with the three pedals.

Fig. 15. Chassis interconnection diagram. Only the chassis that have been covered so far are shown "shaded". The rest will be detailed next month.



The manual unit is separate and extends 16 inches from the front of the case. Originally the two manuals were removable, but time and expansion of the wood made it impossible to separate them without the possibility of damage. The manual unit also contains the stop knobs; the swell knobs on the left side are shown in Fig. 14. These control long wooden bars with spring-wire contacts at the rear ends. The four knobs at the top are part of the combination action which is not used at present. The console the writer selected had the required number of stop knobs, so no alterations were necessary.

Above the upper (swell) manual the original console had a wooden board carrying some coupler tablets in very poor condition. The tabs were removed and some of the writer's own construction substituted, as will be described.

The pedal clavier, shown in Fig. 4 (Part 1), extends 34 inches from the front of the case and is standard in every way. The original console had a hinged manual cover with a music rack; the cover was unsightly and unnecessary so it was removed and the music rack set in place permanently with wooden supports. The bench was good but needed refinishing. After the cabinet was cleaned up, the entire console and the separate pedal clavier were mounted on heavy casters. This paid off since it was necessary to move the assembly around frequently to get at the various parts during the installation of the electronic gear.

Fig. 16 shows the rear of the console, illustrating how the twelve tone generator chassis and the filter board are mounted. Fig. 17 is a drawing of the chassis support assembly and the plugboard. The bottom chassis support is a piece of wood which runs along the bottom of the console. The plugboard assembly is fabricated of aluminum strip with two pieces of wood supporting it, as shown in Fig. 17. All the wooden pieces are fastened by their ends to the inside walls of the organ case so that the entire assembly stands as shown in Fig. 17. Each chassis is fastened in place by one wood screw at the top and another at the bottom. Six busses run along the inside of the bottom chassis support board carrying power from the generator power supply ( $SO_1$  of Fig. 11, Part 1). At each chassis a cable is tapped from the busses, run through a hole in the board, and terminated in a connector which connects into the power plug on a tone generator chassis ( $P_1$ - $P_{12}$ , Fig. 6, Part 1).

The edge of the plugboard can be seen just above the generator chassis in Fig. 16, with all of the connectors sticking out from its top. A view of these generator chassis, from the front of the organ, is shown in Fig. 18, and the plugboard diagram in Fig. 19.  $P_1$  through  $P_{12}$  connect to the 12 generator chassis ( $SO_1$  to  $SO_{12}$ , Fig. 6, Part 1), bringing the tones into the plugboard. The remainder of the con-

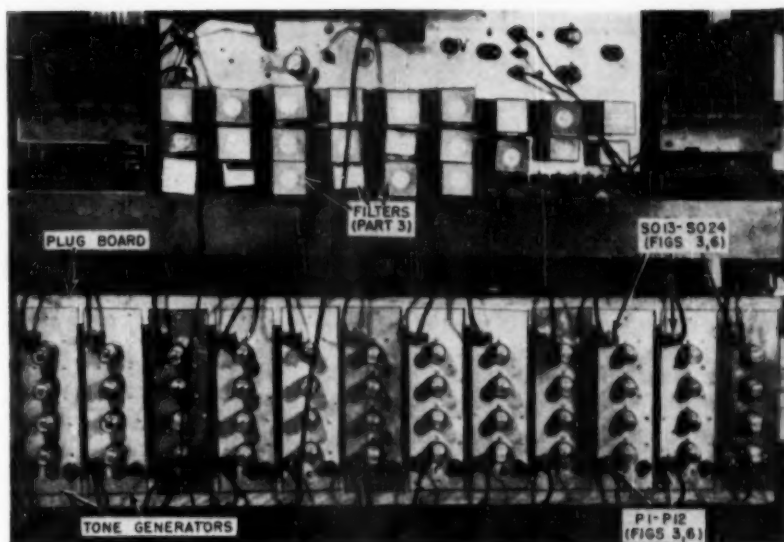


Fig. 16. Rear view of console showing how generator chassis and plugboard are mounted.

nectors are chassis-mounting females, mounted on the aluminum strip. The board rearranges the tones so that each of the output connectors,  $SO_{13}$  through  $SO_{24}$ , supplies one complete octave of twelve tones. Three sets of output connectors are furnished—for great and swell manuals and pedals. The octaves are numbered, in Fig. 19, beginning with the lowest number for the lowest frequency octave. The pedals require only four octaves (actually  $3\frac{1}{2}$ ) and the swell has no 16-foot register and, therefore, requires no tones from octave 1.

The plugboard may be eliminated by individual constructors and the same rearrangement of tones carried out at the key switches themselves. The wiring is bulky and the plugboard does provide a centralized distribution point and in the long run will simplify the over-all assembly operation.

Fig. 17. Mechanical details of the chassis support assembly and of plugboard.

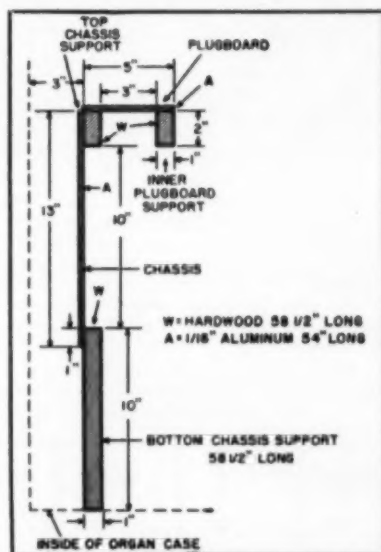
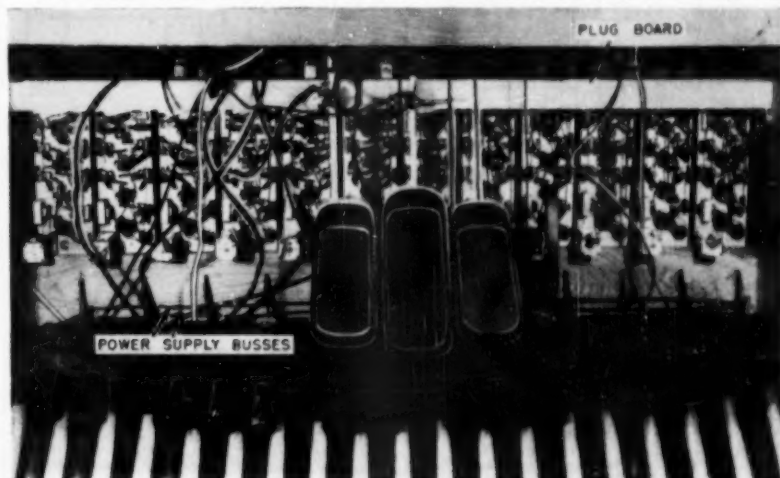


Fig. 18. Front view of the organ showing the tone generator chassis in their places.



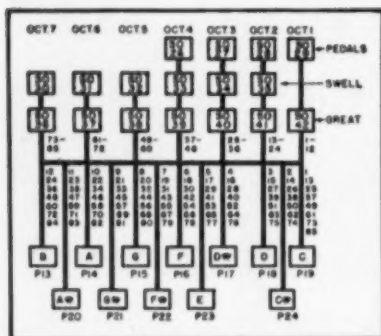


Fig. 19. Interconnection diagram of the plugboard. See text for full details.

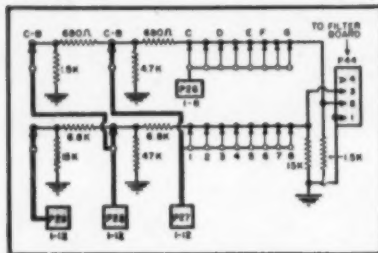


Fig. 20. Wiring of the pedal key-switch assembly for the 8 and 16 foot registers.

### Key-Switch Assemblies

Fig. 21 is a schematic of the great manual key-switch wiring. Each key operates three s.p.s.t. normally-open contacts as shown in the diagram. Let us trace one or two and see how they operate.

$P_{12}$ , Fig. 21, plugs into  $SO_{12}$  on the plugboard shown in Fig. 19.  $SO_{12}$  has

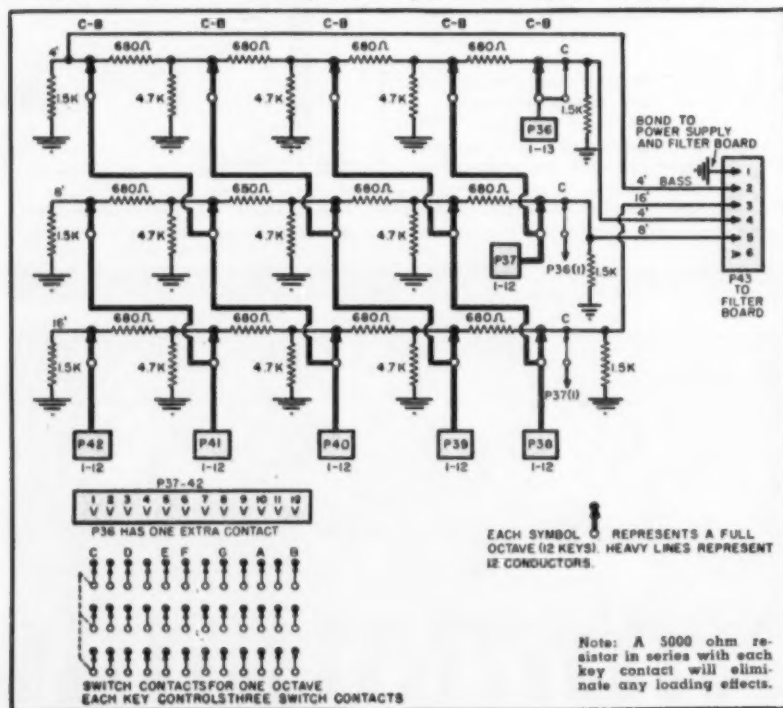
one pin connected to the octave 3 output of each of the twelve tone generators so that  $SO_{12}$  and  $P_{12}$  carry a complete octave of tones between 130.8 and 246.9 cps. The lowest note, C, is on pin 1—the uppermost note, B, is on pin 12.

Pin 1 of  $P_{12}$ , Fig. 21, carries tone to the arm of the 16-foot key switch for the note C in the third octave of the great manual. It also carries the same tone to the 8-foot C in the second octave of the manual and to the 4-foot C in the first octave. Thus, the same note will be heard when any of these three C keys is pressed. However, the note is channeled to a different output in each case and to different stops.

Looking at it from the standpoint of a single key—if the second C on the manual is pressed, the 8-foot output will carry 130.8 cycles. The 4-foot output will carry 261.7 cycles, an octave higher, and the 16-foot output will carry 65.41 cycles, an octave lower.

The outputs of each octave of keys are commoned and a voltage divider is interposed between this octave and the next higher one. All the outputs go to pins of  $P_{12}$ . Because of the voltage dividers, the output levels of the octaves are graduated, with the highest frequency octaves giving the most output. This is done to compensate for the stop filters which will follow (Part 3), most of which have a low-pass characteristic which would suppress the higher-octave fundamentals if this levelling action were not taken. One great stop filter, however, has a high-pass action, so a special 4-foot output is taken for its benefit from the bass end of the 4-foot line and fed

Fig. 21. Complete schematic diagram of the great manual key-switch wiring. See text.



out through pin 2 of  $P_{12}$ . This system of key switching is suggested by the one used in the Baldwin organ where the same problem exists.

The swell key switches are wired in the same way except that there is no 16-foot register and each key is only required to operate two sets of contacts. In wiring the swell use the following plan: Eliminate  $P_{12}$ ;  $P_{12}$  to  $SO_{12}$  of the plugboard;  $P_{12}$  to  $SO_{12}$ ;  $P_{12}$  to  $SO_{12}$ ;  $P_{12}$  to  $SO_{12}$ ;  $P_{12}$  to  $SO_{12}$ ;  $P_{12}$  to  $SO_{12}$ ; and  $P_{12}$  to  $SO_{12}$ .

The output connector,  $P_{12}$ , of the swell assembly is a 4-pin male connected as follows: Pin 1 to ground; pin 2 to treble end of 4-foot output; pin 3 to treble end of 8-foot output, and pin 4 unused.

In each case bond the ground line used for terminating the divider resistors to the chassis of the power supply and to every other major chassis in sight.

Fig. 20 shows the wiring of the pedal key-switch assembly which includes only 8- and 16-foot registers.

No directions can be given for constructing the key-switch assemblies themselves. It is a matter for individual ingenuity. The main reason is that the actions of various organs differ so that the scheme will depend on the key pivot points, the length of the bars, the fastening facilities, space, etc. The writer went to the trouble of having shallow metal troughs made, each the length of the manual. In this were placed plastic mounting boards and each assembly was made up of a series of *Guardian* relay contacts. These contacts are sold for making up odd relay contact combinations and are available as catalogue No. 200-3. A large number of these is necessary. Other constructors may use spring-wire contacts employing phosphor bronze wire or something similar. Nichrome wire is said to be excellent for this application as it does not form an oxide which tends to make for clicking contacts.

Key clicks are not a particular problem in this design, due largely to the low-pass nature of most of the stop filters. If the assembly tends to give clicks after it is built, experiment with condensers across the 4700 ohm and 1500 ohm resistors in Fig. 21 and the other assemblies. Use the smallest capacity which will reduce clicking satisfactorily as larger values will cause undue loss of brilliance in the organ. Experiment separately with each octave for the right value as permissible values will decrease with rising frequency.

As is obvious to those that have read this far, this organ is no toy and its construction involves both time and money—from two-to three-hundred hours' time and between 150 and 400 dollars.

In Part 3, appearing next month, we will cover all of the rest of the circuits used in the "Electronorgan" including complete details on the filter-board setup.

(To be continued)

# ELECTRONIC LIGHT CONTROL

By

**HENRY A. SETZKE, W9LFZ**  
Instructor, De Forests Training Inc.

**T**HE job of turning on and off the lights has largely been taken over by electronic equipment. The lights can be turned on when daylight falls below some predetermined level and turned off when daylight has risen above another predetermined level.

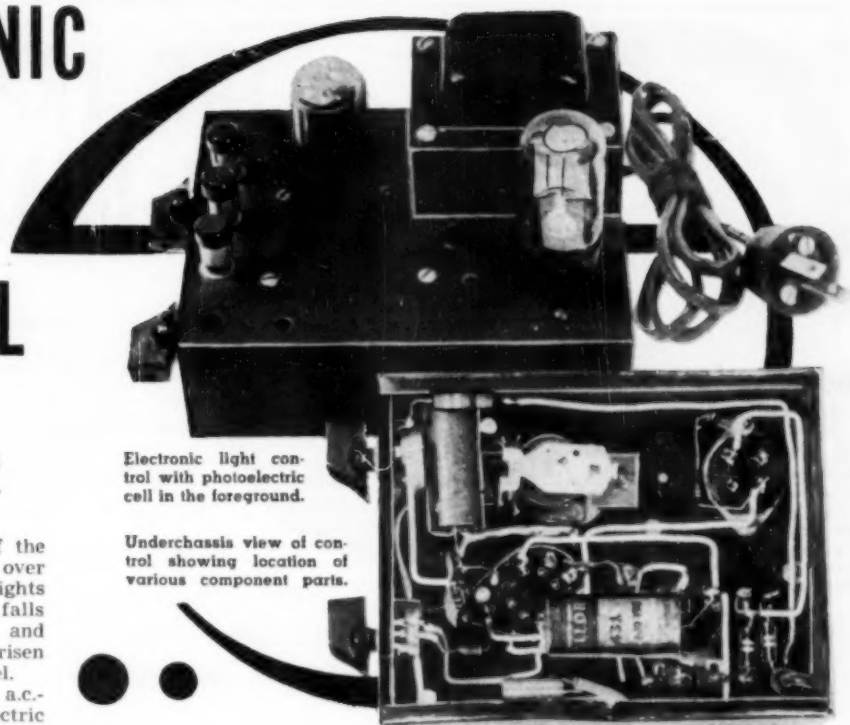
The light control unit is an a.c.-operated device having a photoelectric cell and a two-stage, direct-coupled amplifier to control the relay. The phototube must be mounted high so that it has an unobstructed view of the north sky. During the daytime the bright light, striking the photoelectric tube, causes the relay to pick up and shut off the controlled lights. As night approaches, the sky grows darker until the light is unable to make the relay "hold in." When the relay drops, the lights are turned on.

The photoelectric cell must be mounted and shielded in such a way that very little or none of the light from the controlled lights can fall on the phototube. If this occurs the unit will turn the lights on and off, or "cycle" as it is called.

The photocell may be pointed at a street light, if one is available. When the street light is turned on or off the controlled lights will also be turned on or off. If a street light is used the normally-open contacts of the relay must be connected in series with the controlled lights.

## Construction

All grounds should be connected to a common bus bar but insulated from the chassis. This is to prevent electrical shock and accidental shorts. The normally-closed contacts of the relay should be connected in series with the circuit to be controlled. Almost any type of photoelectric cell may be used in the circuit. As shown, the circuit is designed for a gas-type photoelectric cell. If a high vacuum type photoelectric cell is used it will require more operating voltage which can easily be obtained by moving the one photocell lead from point D to point C.



Electronic light control with photoelectric cell in the foreground.

Underchassis view of control showing location of various component parts.

*An a.c.-operated device that uses a photoelectric cell and a two-stage direct-coupled amplifier to control a relay.*

Phasing of the power supply transformer is very important. If, after completing the wiring, the circuit does not function properly, the difficulty probably lies in the phasing of the power transformer. To reverse the phase reverse the connections on the secondary of the supply transformer at points A and B.

The relay may be any type that will pull in at 8 to 12 ma. or less.

Potentiometer  $R_5$  is the sensitivity control and  $R_4$  is adjusted to give proper bias for tube  $V_{1B}$ .

## Explanation of Circuit

When no light is striking the photo-

cell, no current will flow through the photoelectric cell and the load resistor  $R_1$ . The voltage developed across the phototube load resistor is used as the bias voltage on the first amplifier tube  $V_{1A}$ . Since, under the conditions of no light, no voltage has been developed, the first amplifier tube has no bias.

Under these conditions the first amplifier tube,  $V_{1A}$ , will be passing a large plate current. The plate current flowing through the plate load resistor  $R_2$  causes a voltage drop, which in this case is rather large. The direction of current flow is such that the

(Continued on page 191)

Complete schematic diagram of the a.c.-operated electronic light control unit.

$R_1, R_2$ —5 megohm,  $\frac{1}{2}$  w. res.  
 $R_3, R_4, R_5, R_6$ —20,000 ohm,  $\frac{1}{2}$  w. res.  
 $R_7$ —500,000 ohm pot  
 $R_8$ —100,000 ohm,  $\frac{1}{2}$  w. res.  
 $R_9$ —50,000 ohm pot  
 $C_1$ —5  $\mu$ fd., 100 v. cond.  
 $C_2$ —8  $\mu$ fd., 150 v. elec. cond.  
 $C_3$ —1  $\mu$ fd., 400 v. cond.  
 $RL_1$ —2000 ohm, 12 ma. d.c. relay  
 $S_1$ —S.p.s.t. switch  
 $T_1$ —Any small power transformer of receiving type  
 $V_1$ —6SN7 tube  
 $V_2$ —Photoelectric cell and socket (Cetron CE-22 was used—see text)

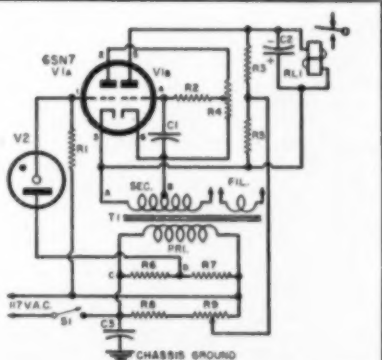




Fig. 1. Front view of the Weston Model 643 with the scale marking changed to 1.5 microamperes, full-scale. Rear view showing the meter movement remounted on Lucite back. Cell (Mallory RM-401) is outside with resistors, transistors, etc., shown mounted inside case.

# THE TRANSISTOR D. C. AMPLIFIER

By

**HERBERT F. STARKE**

Receiving Tube Division  
Raytheon Manufacturing Company

*A new and interesting application of transistors in the instrumentation field. Increased sensitivity is obtained.*

**T**HERE appears to be no sensible reason why transistors should not find their way very quickly into various applications associated with the field of measurement and electronic instrumentation. In view of a definite trend toward miniaturization and low power consumption in this as well as other fields, transistorized versions of familiar laboratory devices should constitute an early, logical step in the development of transistor applications. With this idea in mind, the writer undertook to determine what could be done to increase the sensitivity of a small d.c. meter with a simple and compact circuit using components small enough to permit mounting on the back of the meter.

Several years ago it was thought that the desired result might be achieved with subminiature tubes but a critical survey of the requirements turned out to be rather discouraging. A 20 microampere, 2000 ohm meter may be thought of as having a transconductance of 500 micromhos and if this is to be translated back to the input of a tube circuit, the circuit transconductance must also be 500 micromhos if the device is to introduce a voltage drop no greater than that of the meter alone. For either single-ended or balanced circuits, this means, in practical terms, a tube transconductance of at least 1000 micromhos which becomes very difficult with subminiature tubes operating at low filament currents and "B" voltages.

Fundamentally, the meter is a power device and if we wish to increase its effective sensitivity we must supply power amplification. A 20 microampere, 2000 ohm meter requires 0.8 microwatt for full-scale deflection

and if (a.) 2 microamperes at 20,000 ohms, i.e., the same voltage drop is desired the power gain must be 10 db or (b.) 2 microamperes at 2000 ohms (for the same circuit resistance) requires a power gain of 20 db. These gains are of the sort that may be readily achieved in one stage using junction transistors, a single cell, and a few resistors, with the entire package being of a size that can be mounted in back of the meter case or, for that matter, partly inside the case. (The word "partly" is included only because it does not seem very practical to periodically open a meter case for the purpose of replacing a cell.)

Fig. 2 represents the first attempt at a circuit showing promise of obtaining at least a ten-fold increase in current sensitivity. The evolution to Fig. 3, with the elimination of four resistors out of six, requires some explanation. This, in turn, depends upon the temperature characteristics of the transistors and the need for a high degree of zero stability in the meter amplifier under consideration.

Under certain circuit conditions, transistors make better thermistors than thermistors. That is to say, the temperature coefficient of the cut-off current of the transistor is nearly double the temperature coefficient of resistance of the thermistor. In a circuit intended to be highly responsive to temperature changes (such as the basic form shown in Fig. 4) these coefficients would combine to produce an over-all coefficient on the order of 12% per degree Centigrade provided, of course, both elements were associated with the same thermal circuit. Since in Fig. 4 these effects appear in amplified form in the collector circuit,

it should not be particularly difficult to obtain full-scale deflection on a 20 microampere meter for a temperature change of one degree Centigrade with operating collector currents on the order of 150 or 200 microamperes.

In the case at hand, however, it is desired to make the temperature response as low as possible because here temperature response is the same as zero drift. In a d.c. amplifier using transistors in a grounded emitter circuit (necessary here because the grounded base circuit has current amplification less than unity) the direct first-order cause of collector current drift is the temperature coefficient of the cut-off current and the two are related according to:

$$I_c = (I_{co} + \alpha I_b) / (1 - \alpha)$$

where:

$I_c$  = collector current

$I_b$  = base current

$I_{co}$  = cut-off current (the collector-base current with open emitter)

$\alpha$  = short-circuit current amplification (grounded base).

The foregoing points immediately, of course, to a balanced circuit which allows us to proceed at once to an examination of second- and third-order effects upon zero drift and response. In the circuit of Fig. 2, if the transistors can be matched for cut-off current, temperature coefficient of the cut-off current, and  $\alpha$ , the residual zero-drift over the ordinary range of "room temperature" ( $28 \pm 6^\circ\text{C}$ ) should be very small. In addition, it is quite likely that a transistor of higher-than-average cut-off current can be paired with one of lower-than-average temperature coefficient and *vice versa*. This latter technique could resolve itself into a simple matching of collector currents (at either a fixed or zero base current) with a maximum permissible mis-division of the collector-to-collector load as the sole criterion of temperature behavior, although the effectiveness of the test would be greatly increased if the original balance were followed by checking the shift in zero caused by shorting the input (base-to-base). This, in turn, results in the elimina-

tion of the electrical zero adjustment as shown in Fig. 3 which, as a design feature, would be somewhat more practicable with a meter having a greater range of adjustment of the mechanical zero.

The choice of battery capacity, collector current, and load resistors are all interrelated. If these are chosen with an eye to convenience in the matter of battery replacements, the use of the Mallory RM-12 (also RM-1200) with collector currents of 75 to 100 microamperes will result in operation requiring a new battery only once a year without the inclusion of an "on-off" switch. Collector currents below 100 microamperes, on the other hand, will show some increase in sensitivity with rising temperatures. This can be circumvented by at least two methods: (1.) Choose an operating collector current high enough (about 200 microamperes) so that any small further increase in current amplification is largely offset by compensating changes in other transistor parameters or (2.) use a temperature sensitive meter shunt as shown in Fig. 6. Proper proportions of  $R$  and  $T$  will allow the use of rather low collector currents without causing an unduly large response error over a reasonable range of operating temperature.

Since some degree of matching appears to be inevitable, it seems logical to use only those transistors whose open-base collector currents fall within the desired range. This leads to the elimination of the base resistors and, while the circuit of Fig. 3 seems almost too good to be true, its performance may be seen in Fig. 5 which shows voltage gain, current gain, and power gain as functions of source impedance. These plots, which are typical for the CK721, point out immediately the chief operational defect of the circuit: it cannot measure either current or voltage accurately unless the source impedance is much higher (for current) or much lower (for voltage) than the base-to-base impedance at the transistor input. This means (oddly enough) that the meter is virtually useless for quantitative measurements at the point which gives maximum power gain. This involves an operational concept which is somewhat unusual but it should not trouble us too much if we recall that the original objective was to realize a substantial increase in the current sensitivity of a microammeter with an absolute minimum of components.

Although the meter is of some potential value as a millivoltmeter for use with thermocouples, bolometers, and other low impedance sources, an extra word of caution may be interjected at this point: If the designer elects to use the same meter for current and voltage measurements, the most careful matching of transistor characteristics will be necessary; otherwise there may be a substantial zero shift in going from a high source impedance (0.1 or 1 megohm) to a low impedance (10 or 100 ohms) and vice versa.

December, 1953

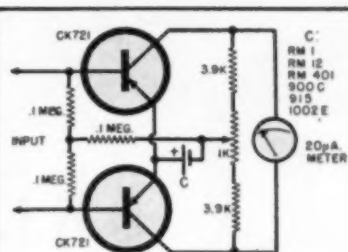


Fig. 2. An early circuit using six resistors, a condenser, two transistors.

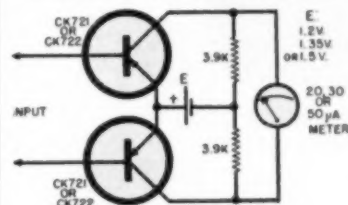


Fig. 3. A simplification of the circuit of Fig. 2 eliminating four of six resistors.

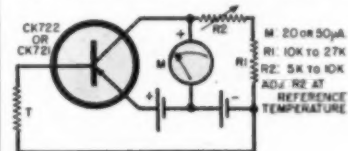


Fig. 4. Basic temperature-sensitive circuit.

The curves shown in Fig. 5 are intended to illustrate only one particular operating point using typical CK721's, which were matched in  $\alpha$ . With a battery current of 150 microamperes (in the open-base circuit) the corresponding collector current of 75 microamperes to each transistor yielded characteristics as indicated in Table 1.

The resulting high input impedance leads, in this case, to rather serious errors if the current source impedance falls very much below 1 megohm. If this is too high for the application at hand, the only remedy is to operate at higher collector current with the im-

(Continued on page 148)

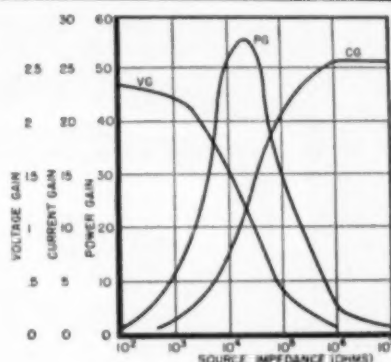


Fig. 5. Performance of the circuit of Fig. 3 shown graphically. Voltage gain, current gain, and power gain are shown as functions of source impedance. All of the values are expressed as factors, not in db.

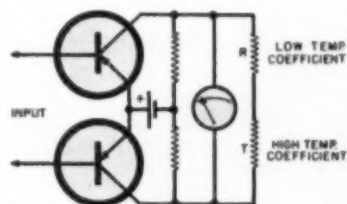


Fig. 6. Temperature-sensitive meter shunt.

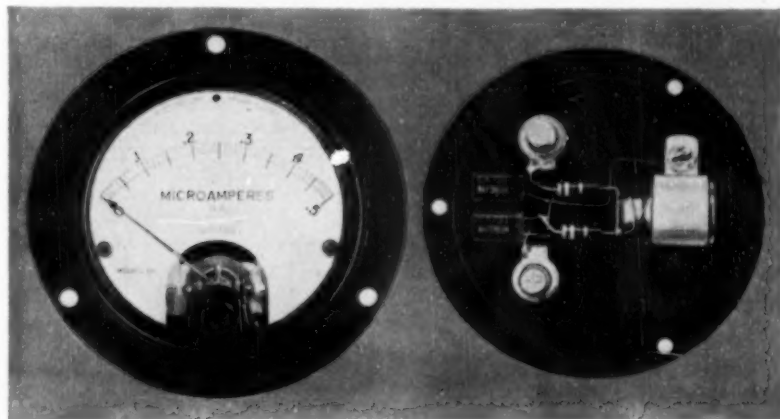
	$\alpha$	$R_c$	$R_b$	$R_e$
$\approx 1$	.966	2.7 meg.	1900 ohms	335 ohms
$\approx 2$	.966	2.6 meg.	1740 ohms	340 ohms

Table 1. Matched transistor characteristics.

CELL	CAPACITY (ma. hours)
1002-E (Eveready) .....	1000
RM-1000 (Mallory) .....	1000
RM-1200 (Mallory) .....	3600
915 (Eveready) .....	800
RM-401 (Mallory) .....	800
RM-625 (Mallory) .....	250

Table 2. Life expectancy, in milliamperes-hours, of various available battery cells which could be used in the construction of transistorized d.c. amplifiers for meters.

Fig. 7. Front and rear view of Weston Model 301 with the scale marking changed to .5 microamperes, full-scale. All parts, including RM-1000 cell are mounted outside.





View of the Regency u.h.f. converter, described in this article.

# The Regency

## U.H.F. CONVERTER

By  
**R. A. MORRIS**  
Chief Engineer, I.D.E.A. Inc.

*Here is a popular converter widely used in u.h.f. areas. Read how it works and how to service it.*

**A**T THE TIME u.h.f. stations were allocated, in the summer of 1952, there were approximately 16 million v.h.f. television receivers in operation. Since then the number has increased to over 22 million, and most of these receivers have no way of receiving u.h.f. signals except through the use of new tuning strips or converters. Of the two, converters are by far the more flexible. A completely self-contained converter can be used with any television receiver, irrespective of the type of tuner it possesses. Furthermore, a converter will, in general, tune over the entire u.h.f. band while a strip is designed essentially for single-channel reception. Last, but not least, converters can be installed by a layman, while a technician is needed to install any unit that must be internally combined with a television receiver.

There are a number of approaches to converter design, but if these are examined with a view toward keeping the final product simple in construction, easy to operate and service, and simple to align, then the field narrows down considerably. Major emphasis is on the tuner and the one finally evolved for the *Regency* converter is only 4 inches in diameter and 3 inches in depth. The unit tunes continuously with a dial drive shaft covering the 70 channels in 340° of rotation, permitting the use of a small direct drive scale. Included in the tuner are two stages of i.f. amplification.

A block diagram of the circuits in this tuner is shown in Fig. 1; the schematic diagram is given in Fig. 2. The input circuit from the u.h.f. antenna is balanced and designed to match a 300-ohm line. This circuit consists of a high-pass filter which serves to reduce oscillator radiation

from the converter, response of the unit to image signals, and the reception of spurious responses, especially those produced by high-powered v.h.f. TV or FM broadcast stations.

Beyond the high-pass filter is the preselector circuit. This consists of a balanced transmission line antenna coupling loop which is inductively coupled to a tunable transmission line. The function of the preselector circuit is the same as that of the r.f. circuit in any receiver, namely, to permit one station to be received, and to reject all others.

A shorting slider varies the frequency of the parallel-wire tuning elements. In covering the u.h.f. band from 470 to 890 mc., the line shorting slider has a 4-inch travel. The slider is noiseless during operation.

Due to the fact that the antenna coupling loop and the crystal mixer (which follows the preselector) are placed at opposite ends of the tuning line, direct coupling between the antenna and mixer circuits is avoided. The tracking problem between preselector and oscillator tuning circuits is simplified by the employment of two trimmer condensers on the preselector lines. One trimmer condenser

is used for setting the high-frequency end and the other is used for setting the low-frequency end of the range. This arrangement allows the electrical tracking of the oscillator and preselector circuits to be a simple and positive alignment operation. The trimmers are a special u.h.f. balanced type which were developed for this tuner.

Once the desired signal has been chosen by the preselector, it is next fed to a crystal mixer. Also reaching the mixer is the oscillator signal.

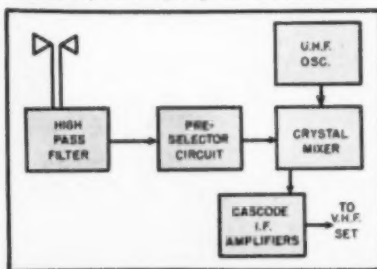
The oscillator circuit is of the ultraudion type widely used in present v.h.f. receivers. A 6AF4 miniature triode is capacity-coupled to a quarter-wave, short-circuited transmission line. The oscillator operates at a lower frequency than the signal, in order that the relative position of the sound and video carriers in the incoming signal is not reversed. Coming into the v.h.f. receiver, the video carrier frequency must be below the sound carrier frequency as in a v.h.f. signal.

In order to receive u.h.f. stations between 470 and 890 mc., the local oscillator tunes from 275 to 695 mc. The v.h.f. set is tuned to channel 10. The oscillator generates adequate injection voltage over the entire frequency range (275 to 695 mc.) without any frequency skips. Oscillator tuning is accomplished by a sliding silver contact which varies the active portion of the line. A trimmer condenser across the oscillator plate tank circuit allows the frequency range to be set to the desired frequency at the low end of the range. Oscillator tuning is mechanically ganged with preselector tuning.

The frequency of the local oscillator stabilizes after approximately five minutes' operation. The maximum deviation due to line voltage drift (within the range of 95 to 125 volts), is approximately 70 kc.

The signal at the output of the crystal mixer is fed to a cascode i.f. amplifier. This i.f. amplifier operates

Fig. 1. Block diagram of the basic circuit of the Regency u.h.f. converter.



over the frequency range of the r.f. amplifier in the v.h.f. television receiver when the latter is set for channel 10. Actually, any of the v.h.f. channels, 8, 9, 10, 11, or 12 can be chosen, permitting the set owner to use the channel which, in his location, is interference-free.

Little need be said about the cascade amplifier other than that it was chosen because of its high gain and low-noise qualities. The output of this stage is balanced, presenting an impedance of 300 ohms to match the v.h.f. receiver unit.

Three views of the tuner are shown in Figs. 3, 4, and 5. In Fig. 3, the tuner is shown as a complete unit with all the covers and shields in place. Fig. 5 is a top view of the tuner with the outer shields removed. The preselector tuning line with its slider and trimmer condensers can be seen at the top of the unit. Back of the line is the antenna coupling loop. In the center of the assembly is the double-triode i.f. amplifier tube.

The bottom side of the tuner, shown in Fig. 4, contains the oscillator circuitry. The oscillator tube rests on its side at the left-hand side of the illustration.

#### Service Hints

In general, alignment will rarely have to be performed on this converter if it receives normal care in use. When servicing is required, the stage at fault can be detected quickly by following the procedures to be outlined:

**Oscillator tube:** The oscillator tube can be checked for oscillation by several methods. One means consists of checking the cathode current and, at the same time, touching the oscillator lines with a screwdriver. The current should rise, indicating that the tube was oscillating and the screwdriver stopped the oscillations.

Another method of checking for oscillation consists of using a vacuum-tube voltmeter with a 1-megohm resistor probe and very short leads to read d.c. voltage on the grid of the 6AF4. This reading should be approximately -3 to -10 volts d.c.

In order to gain access to the oscillator tube, remove the perforated cover on the side of the tuner. In removing the 6AF4, reasonable care should be exercised not to disturb any of the components. It may be necessary to try several tubes in the oscillator circuit, inasmuch as certain tubes will operate better than others for optimum alignment and injection. Usually, changing of the oscillator tube does not require realignment.

**Amplifier tube:** Changing the 6BK7 i.f. amplifier tube should not require any change, other than a touch-up of the converter output adjustment, which extends through the tuner case and can be turned conveniently with the fingers for maximum performance. This adjustment is also made when different v.h.f. channels are selected for the double conversion.

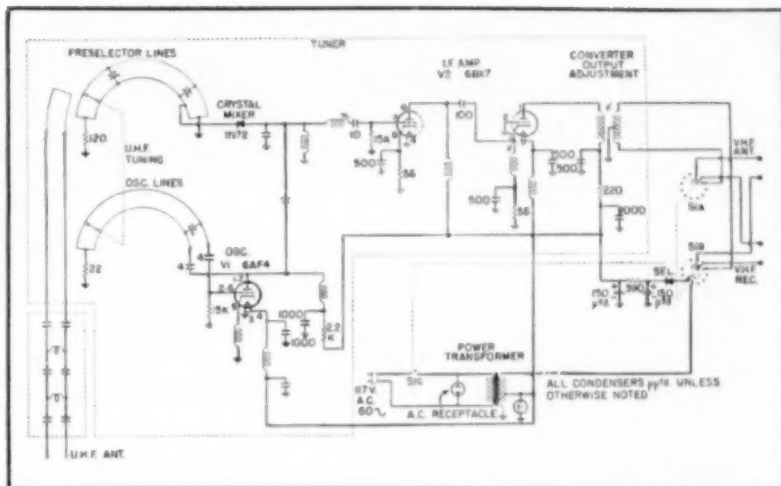


Fig. 2. Schematic diagram of the converter; dotted boxes indicate shielding.



Fig. 3. The completely shielded tuner assembly of the Regency converter.

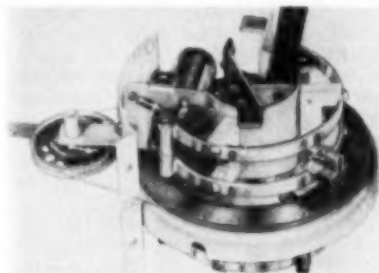


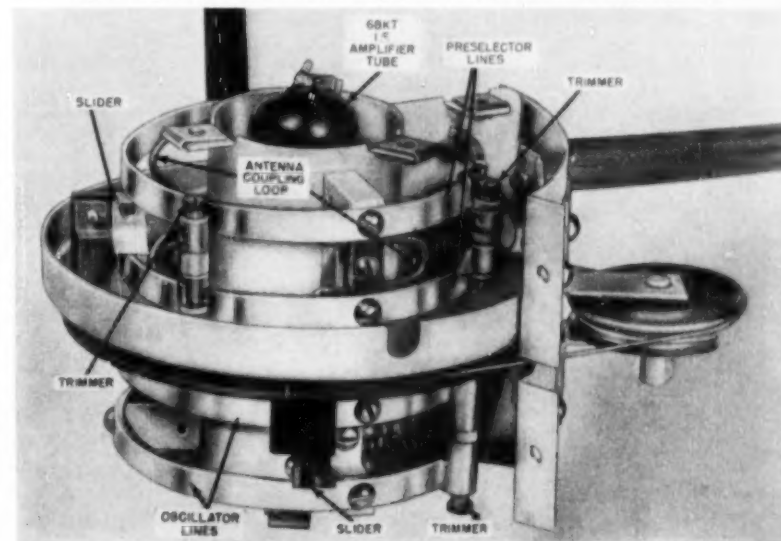
Fig. 4. The bottom view of the tuner showing oscillator tube on its side.

**Crystal diode 1N72:** A defective crystal can be established by the lack of rectified injection voltage, providing the oscillator tube is definitely working. Should a crystal require changing, it is important that the leads be kept the same length and that the position of the new crystal is identical to the defective crystal. Care

should be taken not to overheat the crystal with the soldering iron, and it is advisable to hold the crystal with a pair of pliers back of the soldering point.

All components replaced should be wired into the circuit as near to the original physical placement as possible, with the same size leads. -30-

Fig. 5. Top view of the tuner showing preselector and antenna coupling lines.

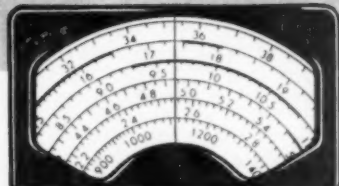




# International

# SHORT-WAVE

Compiled by KENNETH R. BOORD



**YOUR ISW DEPARTMENT** editor, Ken Boord, will play a program of Christmas organ music, by tape transcription, in a special DX broadcast from HCJB, Quito, Ecuador, Thursday, December 17, at 0330 (0830 GMT) with beam to Europe on 15.115, 11.915, 9.745, and repeated the same day at 1600 (2100 GMT) with beam to the South Pacific on 17.890, 15.115, 11.915. Reception reports will be welcomed, especially since by that time HCJB's transmitting facilities should have been completely moved to the new site at Pifo, and new antennas should be in use. HCJB verifies correct reports 100 per-cent; an IRC is appreciated but is not required. Any and all reports on the special program will be appreciated by your editor.

At press time, an official of the station flashed to me that work was progressing on the new European curtain beams, and that both the European and South Pacific beams would be in use in the near future. The North-South beams were put into effect some time ago. Current over-all schedules of HCJB include 700 kc. at 0540-2300; 6.050 at 0540-2400; 9.745 at 1400-1200; 11.915 at 1900-0900; 15.115 at 1200-1000; 17.890 at 1200-1900. The station now broadcasts on *Monday mornings* to 0900, then is silent until 0540 on

*Tuesday mornings*—except that on the *first Monday of each month* there is a special greetings program on 9.745, 11.915, and 15.115 from approximately 1800 to 2200.

## Radio Club Notes

**England**—Congratulations go to the International Short Wave Club which just observed its 24th anniversary; Arthur E. Bear, London, is secretary of the group. ISWC was founded in the United States.

**USA**—QRA for United 49'ers Radio Society is now given as 413 Pershing Ave., Collingdale, Pa.; president is Edward I. Broome, Box 31, Medford, N. J.; editor is William C. Peters, Collingdale; short-wave editor is the former chief editor, Anson Boice, 28 Eisenhower Drive, New Britain, Conn.

Leslie Bannon (WN9TZD), 6260 N. Chester, Indianapolis 20, Ind., has replaced Marvin Robbins as short-wave editor of the Universal Radio DX

Club. Marvin is now serving in the U.S. Armed Forces. This club recently issued a fine short-wave station log, compiled by Robbins and Bannon, which is a *service for members only*.

## This Month's Schedules

(Note: At the time this material was compiled, some stations were still in the process of changing from summer to winter schedules and frequencies; in some cases, hence, schedules may now be *one hour later* than listed herein.—K. R. B.)

**Andorra**—Radio Andorra, 5.997, noted 1720-1800 on this measured channel. (Ferguson, N. C.)

**Anglo-Egyptian Sudan**—At times lately, Radio Omdurman has been heard on 7.100A instead of 7.600A. (Skoog, Sweden) Noted near 7.090 at 1400 with Arabic music; closed 1430; with *English Sun.*, Wed. 1115. (Pearce, England)

**Argentina**—LRY1, 9.760A, Buenos Aires, noted closing 2258 in Spanish when announced for LR3 and LRY. (Ferguson, N. C.) LRX, 9.66, noted in Spanish 2200 and later. (Morgan, Calif.)

LRA, 15.345, is still noted with news 1815 for North America. (Zerosh, Pa.) Might replace this channel at that time with 17.720 for winter. Roberts, Conn., notes LRA1, measured 9.69, at 2255-2330 in Spanish, good level.

**Australia**—VLC9, 9.715, is good level 0700-0845 to Eastern North America; news 0715, 0815. (Morrison, R.I.; Kuhnert, Mass.; Granrose, Fla., others) VLA9, 9.58, is good signal around 0300. (Boyce, N.J.)

**Azores**—By this time, CSA92, 11.090, Ponta Delgada, should be on winter schedule of 1500-1600. (Ferguson, N.C.; Niblack, Ind.) CSA93, 4.865, has news in Portuguese 1630, strong level in Ireland. (ISWL, England)

**Brazil**—A Brazilian station has been noted on 9.685 at 1733 carrying "A Voz do Brasil" relay. (Bellington, N.Y.) Radio Tamoio, 9.610, noted with music and commercials, comments in Portuguese, good level in Ind. around 1800. (Diaz)

Recife, 9.565, noted like a local weekdays 2005-2030 when has "Brazil Calling" (English). (Jensen, N.J.) A Brazilian 6.165A is believed Radio Cultura, Sao Paulo, probably moved from 9.745. (Stark, Texas; Bellington, N.Y.) Radio Nacional, 9.72, noted 2130 through heavy CWQRM; Portuguese. (Continued on page 108)

This young DX'er, John C. Karrer, Philadelphia, uses a Hallicrafters S-38C, and a single wire lead-in to a straight-wire antenna for his station spotting.





## WHY SYLVANIA PRODUCTS MEAN BETTER BUSINESS!

**Y**OU'RE really on board the *better-profit* special when you feature Sylvania Picture Tubes and Receiving Tubes.

Your customers know Sylvania as a pioneer in the development of fine radio and television products. From the very beginning, the name Sylvania has stood for the highest possible quality. And, as the industry has progressed and expanded, Sylvania has taken great care to maintain its recognized leadership.

Now, due to advanced manufacturing techniques and precision testing methods, Sylvania tubes can point to outstanding records, both in long life and fine performance. Today 7 of the 10 leading set manufacturers use Sylvania Picture Tubes and Receiving Tubes.

So, if you want *recognized quality* working on your side . . . sell Sylvania! Call your local Sylvania Distributor for the latest fall prices and money-making promotion offers, or write to: Sylvania Electric Products Inc., Dept. 3R-2112, 1740 Broadway, New York 19, N. Y.

# SYLVANIA



LIGHTING • RADIO • ELECTRONICS • TELEVISION

December, 1953

### Television keeps telling about Sylvania quality

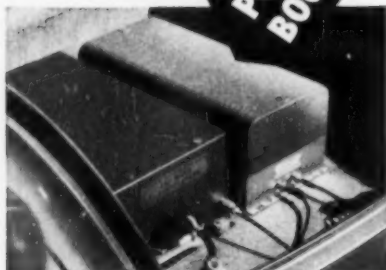


Sylvania's popular nation-wide television show "Beat the Clock" continues to tell millions of your customers week after week, all through the year, about the unbeatable quality of Sylvania products.

In Canada, Sylvania Electric (Canada) Ltd.  
University Tower Bldg., St. Catherine Street, Montreal, P. Q.

# NEW...

**POWER  
BOOSTER**



## NEW POWER BOOSTER Boosts Power instantly!

Stronger signals and greater transmission range even in hilly country are now possible through use of the new Kaar Power Booster, which increases by six times the power output of any 8 to 10 watt mobile transmitter, without adding to standby battery needs—a recent, outstanding engineering achievement of the Kaar research laboratories.

**DEPENDABLE  
MOBILE  
COMMUNICATION**

**RADIOPAK**



Rugged construction...simplicity of design...lowest possible battery drain...exceptional voice quality—these are the features that make the Radiopak the most dependable single unit mobile radiotelephone available today. Furnished for both the 25 to 50 mc band and the 152 to 174 mc band, the Radiopak is ideally suited for use in police cars, taxis, fire department vehicles, trucks, and three-wheeled motorcycles.

• WRITE FOR  
SUMMARY  
CATALOG ON  
ALL KAAR  
MOBILE  
EQUIPMENT

### DEALERS!

Kaar is the only major radiotelephone manufacturer selling through authorized dealers. Write for complete information.

**KAAR**  
**ENGINEERING CORP.**  
MIDDLEFIELD ROAD • PALO ALTO, CALIF.

## Technical BOOKS

**"TELEVISION AND F-M RECEIVER SERVICING"** by Milton S. Kiver. Published by *D. Van Nostrand Company, Inc.*, New York. 316 pages. Price \$4.20. Third Edition. Paper bound.

Mr. Kiver has revised his basic and definitive text to keep pace with the burgeoning television industry.

As is the case with all of this author's writings, this book is hardhitting, clear, and concise. Explanatory material is offered freely so that the student or novice technician may derive maximum benefit from this text.

The book is divided into eighteen chapters covering antennas, TV receiver installation, TV test equipment, r.f. stages, video i.f. and detector stages, video amplifiers and a.g.c. systems, CR picture tubes, servicing intercarrier receivers, using TV test patterns, deflection systems, power supplies, TV receiver alignment, u.h.f. fundamentals, FM fundamentals, commercial FM receiver circuits, and FM receiver alignment and servicing.

Service technicians who have come to depend on Mr. Kiver's books as reference sources will welcome the availability of this new edition.

**"LEARNING THE RADIOTELEGRAPH CODE"** by the ARRL Staff. Published by the *American Radio Relay League*, West Hartford, Conn. 32 pages. Price 25 cents. Paper bound.

This is the Sixth Edition of a handy text which outlines a simple, thoroughly usable method of learning the code with a minimum of time and effort.

The book is divided into six main sections which deal with the learning process, transmission techniques, high-speed operation, operating on the air, code practice, and exercises in receiving and sending for group use.

The chapter on code practice includes circuit diagrams for simple code practice sets which the student can build himself.

Those who have used this handbook in the past will undoubtedly wish to recommend this new edition to newcomers in the field.

**"TELEVISION FUNDAMENTALS"** by Kenneth Fowler and Harold B. Lipfert. Published by *McGraw-Hill Book Co., Inc.*, New York. 520 pages. Price \$7.00.

This book fulfills a long-felt need for a truly basic text dealing with the subject of television theory, circuitry, and servicing. Too often the authors of such "elementary" works, like Don Quixote, "ride off in all directions" under the faulty assumption that their readers are "with them."

The authors of the subject book of this review have assumed nothing except that the reader has some knowledge of basic radio circuitry. The coverage of television is thorough and fundamental.

The writing is clear, concise, and admirably "readable." The use of mathematics has been avoided like the plague with verbal descriptions of mathematical processes being used instead.

The text also includes practical installation procedures, the television antenna, servicing and test equipment, and troubleshooting television receivers by picture analysis.

**"PRINCIPLES OF TRANSISTOR CIRCUITS"** edited by Richard F. Shea. Published by *John Wiley & Sons, Inc.*, New York. 526 pages. Price \$11.00.

This is a book for which the industry has been waiting as it presents most of the basic research material extant on the subject of transistors and transistor circuitry.

Representing a collaboration by ten *General Electric Company* engineers, this text covers all facets of the transistor application problem. Introductory material deals with semiconductor principles and forms, types and characteristics of transistors. The balance of the book is divided into applications for low-frequency circuits, in high-frequency circuits, and special circuits. In order to make the subject matter as easy to grasp as possible the authors have used vacuum-tube analogies as well as similarities and dissimilarities between the two components.

We believe that this definitive work will soon be known as the "bible" of the transistor engineer. Its appearance will offer, between two covers, a single source for the cream of current thinking on the subject.

**"INTRODUCTION TO VALVES"** by R. W. Hallows and H. K. Milward. Published by *Iliffe & Sons Ltd.*, London. 149 pages. Price \$6.75. Available in the U. S. from *The British Book Centre*, 122 E. 55th St., New York 22, N. Y.

This is a basic work which covers the fundamental concepts of tube operation in various types of circuits.

The lavishly illustrated text covers thermionic tubes, diodes as rectifiers and detectors, triodes and their applications, tetrodes and pentodes, multi-grid tubes for frequency changing, power output tubes, and special tubes for u.h.f. and v.h.f. A separate chapter is devoted to a discussion of the modern miniature tube.

Another valuable feature of this text is the complete explanation of the British standard for designating tube types. This standard, adopted in 1947, is used throughout the book.

While some knowledge of mathematical processes would be helpful to the reader, the text is clearly and simply written so that the student may gain the maximum benefit from his studies. Although the terminology is British, the United States reader should have no difficulty in making the transition.

-30-



**YOUR ELECTRONIC  
EQUIPMENT**

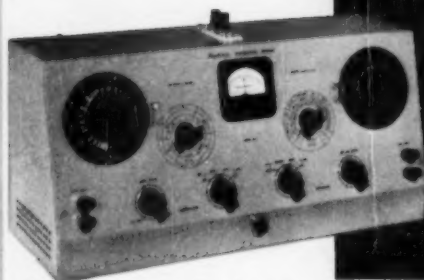
**Demands Highly Specialized**

**WIRE**

THE MANUFACTURERS  
AND SERVICE MEN  
WHO SERVE BEST

*Specify* **Belden**

**WIREMAKER FOR INDUSTRY**



## Heathkit IMPEDANCE BRIDGE KIT

MODEL IB-2

**\$59<sup>50</sup>**

SHIPPING WT.  
15 LBS.

Another new, outstanding instrument design so typically characteristic of Heathkit operation in producing high quality instrument kits at the lowest possible price. A new, improved model Impedance Bridge kit featuring modern cabinet styling, with slanted panel for convenience of operation and interpretation of scales at a \$10.00 price reduction over the preceding model. Built-in adjustable phase shift oscillator and amplifier with all tubes of the battery operated type completely eliminates warm-up time. The instrument is entirely AC line operated. No bothersome battery replacements.

The Heathkit IB-2 Impedance Bridge Kit actually represents four instruments in one compact unit. The Wheatstone Bridge for resistance measurements, the Capacity Comparison Bridge for capacity measurements, Maxwell Bridge for low Q, and Hay Bridge for high Q inductance measurements. Read Q, D, DQ all on one dial thereby eliminating possible confusion due to the incorrect dial reference or adjustment. Only one set of instrument terminals nec-

essary for any measurement function. Panel provisions provided for external generator use.

A newly designed two section CRL dial provides ten separate "units" switch settings with an accuracy of .5%. Fractions of units are read on a continuously variable calibrated wire-wound control. A special minimum capacity, shielded, balanced impedance matching transformer between the generator and the bridge. The correct impedance match is automatically switch selected to provide constant load operation of the generator circuit. The instrument uses 1/2% precision resistors and condensers in all measurement circuits.

The new Heathkit IB-2 provides outstanding design features not found in any other kit instrument. The single low price includes the power supply, generator, and amplifier stages. No need to purchase separate instrument accessories in order to obtain the type of operation desired.

### Features

- Simpson 100-0-100 microampere meter.
- Completely AC operated.
- Built-in phase shift generator and amplifier.
- Battery type tubes, no warm-up required.
- Newly designed two section CRL dial.
- Single knob D, Q, and DQ functions.
- Special impedance matching transformer.
- New modern cabinet styling.
- 1/2% precision resistors and silver mica condensers.

## Heathkit AUDIO WATTMETER KIT



MODEL AW-1

**\$29<sup>50</sup>**

SHIPPING WT.  
6 LBS.

A new Heathkit design for the audio engineer, serious hi fi enthusiast, recording studio, or broadcast station; the Heathkit Audio Wattmeter Kit. This specialized instrument instantly indicates the output level of the equipment under test without requiring the use of external load resistors. All readings are taken directly from the calibrated scales of a 4 1/2" 200 microampere Simpson meter.

The Heathkit Audio Wattmeter features five full scale power measurement ranges from 5 milliwatts up to 50 watts with db ranges of -15 db to +48 db. The instrument has a power measurement rating of 25 watts continuous and 50 watts maximum for intermittent operation. Non-inductive resistance load impedances of 4, 8, 16, and 600 ohms are provided through a panel impedance selector switch. Frequency effect is negligible from 10 cycles to 250 kc. A conventional VTVM circuit utilizes a 12AU7 twin triode tube. The meter bridge circuit uses four germanium diodes for good linearity.

With the Heathkit AW-1 desired information can be obtained instantly and conveniently without bothering with the irksome setups and calculations usually required. Useful for power curve measurements, frequency response checks, monitoring indicator, etc. Convenient calibration directly from 110 volt AC line source. This new instrument will help to supply the answers to your audio operating or power output problems.

## Heathkit LABORATORY GENERATOR KIT

MODEL LG-1

**\$39<sup>50</sup>**

SHIP. WT.  
16 LBS.



Another welcome

new addition to the popular line of Heathkit instruments, the Heathkit Laboratory Generator.

Specially designed for flexibility of operation, accuracy and versatility beyond the performance level provided by the conventional service type generator. Frequency coverage of the Colpitts oscillator is 150kc to 30mc in five convenient ranges with provisions for internal or external modulation up to 50%, and .1 volt RF output throughout the frequency range. Panel mounted 200 microampere Simpson meter for RF "set reference level" to provide relative indication of RF output. Individually shielded oscillator and shielded variable and step attenuator provide flexible control of RF output.

The circuit features a 6AF4 high frequency oscillator, a 6AV5 amplifier with grid modulation, 12AU7 400 cycle oscillator and modulator, OB2 voltage regulator tube, and a selenium rectifier for the transformer operated power supply. The smart professional instrument appearance and over-all flexibility of operation will prove a decided asset to any industrial or educational laboratory. The Heathkit Laboratory Generator sets a new level of operation, far superior to any instrument in this price range.

**HEATH COMPANY • Benton Harbor 15, Mich.**

## CHECK THESE *Features*

- ✓ New 5U1 CR tube
- ✓ Re-trace blanking
- ✓ Voltage regulation
- ✓ Extended band width
- ✓ Peak-to-peak calibrating provisions
- ✓ Good square wave response
- ✓ Astigmatism control
- ✓ New heavy duty shielded power transformer

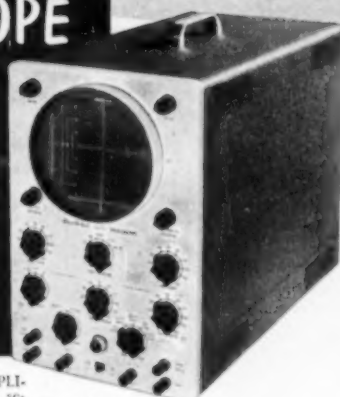
## NEW 5" *Heathkit* OSCILLOSCOPE KIT

MODEL O-9

**\$59<sup>50</sup>**

SHIPPING

WT. 28 LBS.



Announcing the latest addition to a brilliant series of Heathkit Oscilloscopes, the new Model O-9. This outstanding instrument incorporates all of the features developed and proven in the production of well over 50,000 kits, in addition to a host of many new design features for truly outstanding performance. This new scope features a brand new (no surplus) commercially available 5U1 cathode ray tube for fine focusing, high intensity, and freedom from halation. The 5" CR tube is the standard size for design and industrial laboratories, development engineers, and service men. The only size CR tube offering a wide range of types, colors, phosphors, and persistence. The answer to good oscilloscope performance lies in improved basic design and operating characteristics, and not in the use of larger CR tubes.

**VERTICAL AMPLIFIER** — New extended band width vertical amplifier with sensitivity of .025 volts per inch, down 3 db at 2 mc, down only 1/2 db at 5 mc. Three step vertical input attenuator, quality ceramic variable capacitors for proper input compensation, provisions for calibrated 1 volt peak-to-peak reference, with calibrated screen for direct reading of TV pulses.

### HORIZONTAL AMPLIFIER

— New input selector switch provides choice of horizontal input, 60 cycle sweep input, line sync, internal sync, and external sync. Expanded horizontal sweep produces sweep width several times the cathode ray tube diameter. New blanking amplifier for complete retrace blanking and new phasing control.

**POWER SUPPLY** — New high voltage power supply and filtering circuit for really fine hairline focusing. New heavy duty power transformer with adequate operating reserve. Voltage regulated supply for both vertical and horizontal amplifiers for absolutely rock steady traces and complete freedom from bounce and jitter due to line variations.

The acid test of any oscilloscope operation is the ability to reproduce high frequency square waves and the new Heathkit O-9 will faithfully reproduce square waves up to 500 kc. This is the ideal all around, general purpose oscilloscope for educational and industrial use, radio and TV servicing, and any other type of work requiring the instantaneous reproduction and observation of actual wave forms and other electrical phenomena.



NO. 342

**\$3<sup>50</sup>** SHIP. WT. 1 LB.

## *Heathkit* LOW CAPACITY PROBE KIT

Oscilloscope investigation of high frequency, high impedance, or broad bandwidth circuits encountered in television work requires the use of a low capacity probe to prevent loss of gain, distortion, or false service information. The Heathkit Low Capacity Probe features a variable capacitor to provide the necessary degree of instrument impedance matching. New probe styling with bright polished aluminum housing and polystyrene probe ends.



NO. 337-B

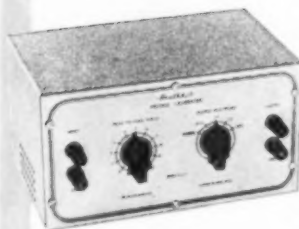
**\$3<sup>50</sup>**

SHIP. WT. 1 LB.

## *Heathkit* SCOPE DEMODULATOR PROBE KIT

In applications such as trouble shooting or aligning TV, RF, IF, and video stages, the frequency ranges encountered require demodulation of signals before oscilloscope presentation. The newly-styled Heathkit Demodulator Probe in polished aluminum housing will fulfill this function and readily prove its value as an oscilloscope service accessory. Detailed assembly sheet provided, including instructions for probe operation.

## *Heathkit* VOLTAGE CALIBRATOR KIT



MODEL VC-2

**\$11<sup>50</sup>**

SHIPPING WT. 4 LBS.

The Heathkit Voltage Calibrator provides a convenient method of making peak-to-peak voltage measurements with an oscilloscope by establishing a relationship on a comparison basis between the amplitude of an unknown wave shape and the known output of the voltage calibrator. Peak-to-peak voltage values are read directly on the calibrated panel scales. To offset line voltage supply irregularities, the instrument features a voltage regulator tube.

With the Heathkit Voltage Calibrator, it is possible to measure all types of complex wave forms within a voltage range of 0.1 to 100 volts peak-to-peak. A convenient "signal" position on the panel switch bypasses the calibrator completely and the signal is applied to the oscilloscope input thereby eliminating the necessity for transferring test leads.

## *Heathkit* ELECTRONIC SWITCH KIT

The basic function of the Heathkit S-2 Electronic Switch Kit is to permit simultaneous oscilloscope observation of two separate traces which can be either separated or superimposed for individual study. A typical example would be observation of a signal as it appears at both the input and output stages of an amplifier. It will also serve as a square wave generator over the range of switching frequencies often providing the necessary wave form response information without incurring the expense of an additional instrument.

Continuously variable switching rates in three ranges from less than 10 cps to over 2,000 cps. Individual controls for each input channel and a positioning control. The five tube transformer operated circuit utilizes two 6SJ7, two 6SN7, and one 6X5 tubes. Buy this kit and enjoy increased versatility of operation from your oscilloscope.



MODEL S-2

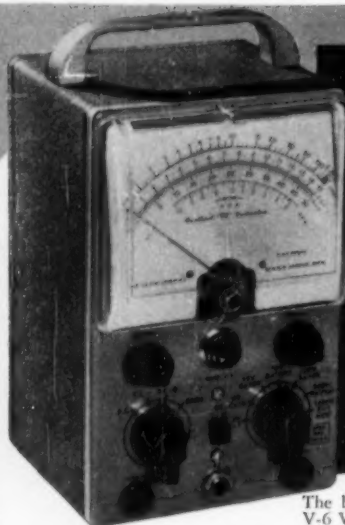
**\$23<sup>50</sup>**

SHIP. WT. 11 LBS.

**HEATH COMPANY • Benton Harbor 15, Mich.**

December, 1953

91



## Heathkit VACUUM TUBE VOLTMETER KIT

MODEL V-6

**\$24<sup>50</sup>**

SHIPPING WT. 6 LBS.

The beautiful Heathkit Model V-6 VTVM, the world's largest selling kit instrument, now offers many outstanding new features in addition to retaining all of the refinements developed and proven in the production of over 100,000 VTVM's. This is the basic measuring instrument for every branch of electronics. Easily meets all requirements for accuracy, stability, sensitivity, convenience of ranges, meter readability, and modern styling. It will accurately measure DC voltages, AC voltages, offers tremendous ohmmeter range coverage, and a complete db scale for a total of 35 meter ranges.

New 1½ volt full scale low range provides well over 2¼" of scale length per volt. Upper DC scale limit 1,500 volts. DC ranges 0-1.5, 5, 15, 50, 150, 500, 1,500 volts full scale. AC ranges 0-1.5, 5, 15, 50, 150, 500, 1,500 (1,000 volts maximum). Seven ohm-

meter ranges from .1 ohm to 1,000 megohms. For added convenience a DC polarity reversing switch and a center scale zero adjustment for FM alignment.

The smartly styled, compact, sturdy, formed aluminum cabinet is finished in an attractive gray crackle exterior. The beautiful two-color, durable, infra-red, baked enamel panel further adds to the over-all professional appearance.

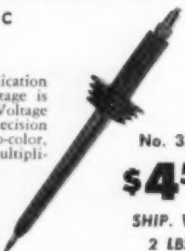
Top quality components used throughout. 1% precision resistors — silver contact range and selector switches — selenium rectifier — transformer operated power supply. Individual calibration on both AC and DC for maximum accuracy. DB scale printed in red for easy identification, all other scales a sharp, crisp black for easy reading. A variety of accessory probes shown on this page still add further to over-all instrument usefulness.

### Features

- ✓ New 1½ volt full scale low range
- ✓ 1,500 volt upper limit DC range
- ✓ Increased accuracy through 50% greater scale coverage
- ✓ High impedance 11 megohm input
- ✓ Center scale zero adjust
- ✓ Polarity reversal switch
- ✓ 1% precision resistors
- ✓ Clearly marked db scales

### Heathkit 30,000 VOLT DC PROBE KIT

For TV service work or any similar application where the measurement of high DC voltage is required, the Heathkit Model 336 High Voltage Probe Kit will prove invaluable. A precision multiplier resistor mounted inside the two-color, sleek, plastic probe body provides a multiplication factor of 100 on the DC ranges of the Heathkit 11 megohm VTVM. The entire kit includes precision resistor, two-color plastic probe, tip connector spring, test lead, plug & plug panel connector, and complete assembly instructions.



No. 336

**\$4<sup>50</sup>**

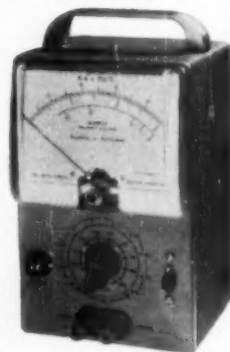
SHIP. WT.  
2 LBS.

## Heathkit AC VACUUM TUBE VOLTMETER KIT

MODEL AV-2

**\$29<sup>50</sup>**

SHIPPING WT.  
5 LBS.



No. 335-B

### Heathkit PEAK-TO-PEAK PROBE KIT

Now read peak-to-peak voltages on the DC scales of the Heathkit 11 megohm VTVM. Readings can be directly made from the VTVM scale without involved calculations. Measurements over the frequency range of 5 kc to 5 mc. Use this probe to extend the usefulness of your VTVM in radio and TV service work. The Peak-to-Peak Probe Kit features the new polished aluminum housing with two-color polystyrene probe ends. Detailed assembly sheet including instructions for probe operation.

**\$5<sup>50</sup>**  
SHIP. WT. 2 LBS.

### Heathkit RF PROBE KIT

The Heathkit RF Probe used in conjunction with any 11 megohm VTVM will permit RF measurements up to 250 mc. ± 10%. A useful, convenient accessory for those occasions when RF measurements are desired. The RF probe body is housed in the new, smartly-styled polished aluminum probe body featuring two-color polystyrene probe ends and a low capacity flexible shielded test lead. The kit is complete with all necessary material and a detailed assembly sheet as well as instructions for probe operation.



No. 309-B

**\$3<sup>50</sup>**

SHIP. WT. 2 LBS.

The new Heathkit AC VTVM that makes possible those sensitive AC measurements required by laboratories, audio enthusiasts, and experimenters. Especially useful for hum investigation, sensitive null detection, phono pick-up output measure-

ments, making frequency response runs, gain measurements, ripple voltage checks, etc. Low level measurements are easy to make because of the complete voltage coverage of the instrument and the one knob operation.

The large 200 microampere Simpson meter has clearly marked and easy to read meter scales. Ten voltage ranges covering from .01 rms full scale to 300 volts rms full scale, with frequency response ± 1 db from 20 cycles to 50,000 cycles. Instrument input impedance 1 megohm, ten db ranges from -52 db to +52 db. For stability and good linearity characteristics the meter bridge circuit features 4 germanium diodes. Attractive instrument styling, a companion piece for the popular Heathkit VTVM and the new AW-1 Audio Wattmeter.

**HEATH COMPANY • Benton Harbor 15, Mich.**

## CHECK THESE *Features*

- ✓ 20,000 ohms per volt DC sensitivity, 5,000 ohms per volt on AC
- ✓ Polarity reversal switch
- ✓ 1% precision multiplier resistors
- ✓ 50 microampere 4½" Simpson meter
- ✓ Meter ranges for service convenience
- ✓ New resistor ring-switch assembly
- ✓ Total of 35 meter ranges
- ✓ New Modern cabinet styling

## NEW *Heathkit* MULTIMETER KIT

MODEL MM-1

**\$26.50**

SHIPPING WT. 6 LBS.



The most important Heathkit announcement of the year, the new 20,000 ohms per volt Heathkit Multimeter, Model MM-1. The universal service measuring instrument, accurate, sensitive, portable, and completely independent of AC line supply. Particularly designed for service use incorporating many desirable features for the convenience of the service man. Full 20,000 ohms per volt sensitivity on DC ranges—5,000 ohms per volt sensitivity on AC—polarity reversal switch, no bothersome transferring of test leads—1% precision multiplier resistors—large 4½" recessed non-glare 50 microampere Simpson meter—conveniently slanted control panel—recessed safety type banana jacks—standard universally available batteries—rugged practical sized cabinet with plastic carrying handle, and a total of 35 calibrated meter ranges.

### RANGES

Voltage ranges selected entirely for service convenience. For example 1½ volt full scale low range for measuring portable radio filament voltages, bias voltages, etc., 150 volt full scale range for AC-DC service work, 500 volt full scale range for conventional transformer operated power supply systems. Complete voltage ranges AC and DC, 0-1.5—5—50—150—500—1,500—5,000 volts. DC current ranges, 0-150 microamperes—15 milliamperes—150 milliamperes—500 milliamperes—15 amperes. Resistance measurements from .2 ohms to 20 meg-

ohms x 1 x 1,000 x 10,000.  
DB coverage from -10 db  
to +65 db.

### CONSTRUCTION

Entirely new design permits assembly, mounting and wiring of precision resistors on a ring-switch assembly unit. The major portion of instrument wiring is completed before mounting the ring-switch assembly to the panel. No calibration procedure is required, all precision resistors readily accessible in event of replacement.

### CABINET

Strikingly modern cabinet styling featuring two piece construction, durable black Bakelite cabinet, with easy to read panel designations. Cabinet size 3½" wide x 4" deep x 7½" high. Good cabinet physical stability when operated in vertical position.

The Heathkit MM-1 represents a terrific instrument value for a high quality 20,000 ohms per volt unit using all 1% deposited carbon type precision resistors. Here is quality, performance, functional design, and attractive appearance, all combined in one low priced package.

## *Heathkit* BATTERY TESTER KIT



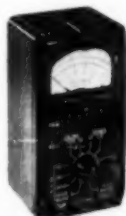
MODEL BT-1

**\$8.50**

SHIP. WT.  
2 LBS.

The Heathkit Battery Tester measures all types of dry batteries between 1½ volts and 150 volts under actual load conditions. Readings are made directly on a three color Good-Weak-Replace scale. Operation is extremely simple and merely requires that the test leads be connected to the battery under test. Only one control to adjust in addition to a panel switch for "A" or "B" battery types. The Heathkit Battery Tester features compact assembly, accurate meter movement, and a three deck wire-wound control, all mounted in a portable rugged plastic cabinet. Checks portable radio batteries, hearing aid batteries, lantern batteries, etc.

## *Heathkit* HANDITESTER KIT



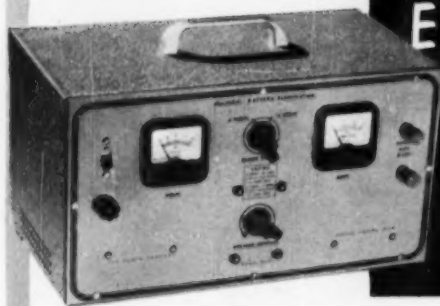
MODEL M-1

**\$14.50**

SHIPPING WT.  
3 LBS.

The Heathkit Model M-1 Handitester readily fulfills major requirements for a compact, portable volt ohm milliammeter. Despite its compact size, the Handitester is packed with every desirable feature required in an instrument of this type. AC or DC voltage ranges full scale, 0-10—30—300—1,000—5,000 volts. Two ohmmeter ranges, 0-5,000 and 0-300,000. Two DC current measurement ranges, 0-10 milliamperes and 0-100 milliamperes. The instrument uses a Simpson 400 microampere meter movement, which is shunted with resistors to provide a uniform 1 milliampere load on both AC and DC ranges. Special type, easily accessible, battery mounting bracket—1% deposited carbon type precision resistors—hearing aid type ohms adjust control. The Handitester is easily assembled from complete instructions and pictorial diagrams. Necessary test leads are included in the price of this popular kit.

**HEATH COMPANY • Benton Harbor 15, Mich.**



## New Heathkit 12 Volt BATTERY ELIMINATOR KIT

MODEL BE-4

**\$31<sup>50</sup>**

SHIPPING WT.  
18 LBS.

### CHECK THESE *Features*

- ✓ Either 6 or 12 volt operation
- ✓ Continuously variable voltage output
- ✓ Constant ammeter and voltmeter monitoring
- ✓ Automatic overload relay — self-resetting
- ✓ Two 10,000 mf condensers
- ✓ New 18 disc split type heavy duty rectifier unit
- ✓ Fuse protection

Here is the new Heathkit Battery Eliminator necessary for modern, up-to-date operation of your service shop. The Heathkit Model BE-4 furnishes either 6 volts or 12 volts output which can be selected at the flick of a panel switch. Use the BE-4 to service the new 12 volt car radios in addition to the conventional 6 volt radios.

This new Battery Eliminator provides two continuously variable output ranges, 0-8 volts DC at 10 amperes continuously, or 15 amperes maximum intermittent; 0-16 volts DC at 5 amperes continuously or 7.5 amperes maximum intermittent. The output voltage is clean and well filtered as the circuit uses two 10,000 mf condensers. The continuously variable voltage output feature is a definite aid in determining the starting point of vibrators, the voltage operating range of oscillator circuits, etc. Panel mounted meters constantly monitor voltage and cur-

rent output and will quickly indicate the presence of a major circuit fault in the equipment under test. The power transformer primary winding is fuse protected and for additional safety an automatic relay of the self-resetting type is incorporated in the DC output circuit. The heavy duty rectifier is a split type 18 plate magnesium copper sulfide unit used either as a full wave rectifier or voltage doubler according to the position of the panel range switch.

Here is the ideal battery eliminator for all of your service problems and as an additional feature, it can also be used as a battery charger. Another new application for the Heathkit Battery Eliminator is a variable source of DC filament supply in audio development and research. More than adequate variable voltage and current range for normal applications.

## Heathkit VIBRATOR TESTER KIT

Your repair time is valuable, and service use of the Heathkit Vibrator Tester will save you many hours of work. This tester will instantly tell you the condition of the vibrator being checked. Checks vibrators for proper starting and the easy to read meter indicates quality of output on a large Bad-Good scale. The Heathkit VT-1 checks both interrupter and self rectifier types of vibrators. Five different sockets for checking hundreds of vibrator types.

The Heathkit Vibrator Tester operates from any battery eliminator capable of delivering continuously variable voltage from 4 to 6 volts DC at 4 amperes. The new Heathkit Model BE-4 Battery Eliminator would be an ideal source of supply.



MODEL VT-1

**\$14<sup>50</sup>**

SHIPPING WT.  
6 LBS.

## NEW Heathkit VARIABLE VOLTAGE ISOLATION TRANSFORMER KIT

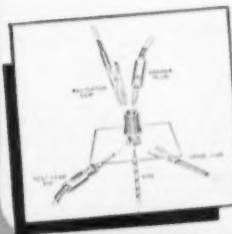
The new Heathkit Isolation Transformer Kit provides line isolation for AC-DC radios (not an auto transformer), thereby eliminating shock hazard, hum problems, alignment difficulties, etc. The output voltage is variable from 90 to 130 volts AC and is constantly monitored by a panel mounted AC volt meter. Use it to increase AC supply voltage in order to induce breakdown of faulty components in circuits thereby saving service time. Use it also to simulate varying line voltage conditions and to determine the line voltage level at which oscillator circuits cease functioning, particularly in three-way portable radios. Rated at 100 watts continuous operation and up to 200 watts maximum intermittent operation. A useful radio and TV service tool.



MODEL IT-1

**\$16<sup>50</sup>**

SHIP. WT. 9 LBS.



## Heathkit BINDING POST

Binding post kit now available so that standardization of all instrument connectors is possible. This new, five-way binding post will accommodate an alligator clip, banana plug, test lead pin, spade lug, or hook-up wire. Sold in units of 20 binding post assemblies. Each assembly includes binding post, flat and shoulder fiber washers, solder lug, and nut. 120 pieces in all. Kit 362, \$4.00.



## Heathkit TECHNICAL APPLICATION BULLETINS

An exclusive Heathkit service. Technical application bulletins prepared by recognized instrument authorities outlining various combinations of instrument applications. Available now with 40 four-page illustrated bulletins and an attractive flexible loose-leaf binder. Only \$2.00. (No c.o.d. on this item, please.)

**HEATH COMPANY • Benton Harbor 15, Mich.**

### CHECK THESE *Features*

- ✓ INCREDUCTOR controllable inductor sweep
- ✓ TV and IF sweep deviation 12-30 mc
- ✓ 4 mc- 220 mc continuous frequency coverage
- ✓ Oscillator operation entirely on fundamentals
- ✓ Output in excess of 100,000 microvolts
- ✓ Automatic amplitude circuit
- ✓ Voltage regulation
- ✓ Simplified operation

## NEW *Heathkit* TV ALIGNMENT GENERATOR KIT

MODEL TS-3

**\$44.50**

SHIPPING WEIGHT  
18 POUNDS



Proudly announcing an entirely new, advanced model TV and FM Sweep Generator, the Heathkit Model TS-3. This new design provides features and combinations of functions not found in any other service type instrument. Every design consideration has been given to the requirements of the TV service man to provide a flexible, variable sweep source with more than adequate RF output and complete frequency coverage throughout the TV and FM spectrum.

The frequency range of the TS-3 is from 4 mc to 220 mc in four switch selected ranges. All frequency ranges are overlapping for complete coverage. A particularly important feature of the instrument is that the oscillator operates entirely on fundamentals, thereby providing complete freedom from spurious oscillation and parasitics normally encountered in beat frequency type oscillators. This circuitry assures a much higher total RF output level and simplifies attenuation problems.

The new TS-3 features an entirely new principle of sweep operation. Sweep action is entirely electronic with no moving parts or electro-mechanical devices so commonly used. The heart of the sweep system is a newly-developed INCREDUCTOR controllable inductor. With this system, the value of inductance of each oscil-

lator coil is electrically varied with an AC control current, and the inductance variation is achieved by a change in the magnetic state of the core on which the oscillator coils are wound. This system provides a sweep deviation of not less than 12 mc on all TV frequencies, and up to a maximum of 30 mc on TV IF frequencies. The high RF output level throughout the instrument frequency range overcomes the most common complaint of the older type sweep generators. A new, automatic amplitude control circuit maintains the output level flat to  $\pm 2$  db throughout the instrument range. For convenience of operation a low impedance 50 ohm output is used.

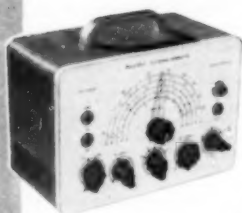
Operation of the instrument has been simplified through the reduction of panel controls and separate panel terminals provide for external synchronization if desired. The circuit uses a voltage regulator tube to maintain stable instrument operation. A built-in variable oscillator marker further adds to flexibility of instrument operation. Provisions are also made for the use of an external marker, such as your service type signal generator, if desired. Use the Heathkit TS-3 for rapid, accurate TV alignment work, and let it help you solve those time consuming, irksome problems so frequently encountered.

## NEW *Heathkit* SIGNAL GENERATOR KIT

MODEL SG-8

**\$19.50**

SHIPPING WEIGHT  
8 POUNDS



Announcing the new Heathkit Model SG-8 service type Signal Generator, incorporating many design features not usually found in an instrument in this price range. The RF output is from 160 kc to 100 mc in five ranges, all on fundamentals, with useful harmonics up to 200 mc. The RF output level is in excess of 100,000 microvolts throughout the frequency range.

The oscillator circuit consists of a 12AT7 twin triode tube. One half is used as a Colpitts oscillator, and the other half as a cathode follower output which acts as a buffer between the oscillator and external load. This circuitry eliminates oscillator frequency shift usually caused by external circuit loading.

All coils are factory wound and adjusted, thereby completely eliminating the need for calibration and the use of additional calibrating equipment. The stable low impedance output features a step and variable attenuator for complete control of RF level. A 6C4 triode acts as a 400 cycle sine wave oscillator and a panel switching system permits a choice of either external or internal modulation.

The transformer operated circuit is easy to assemble, requires no calibration, and meets every service requirement for an adjustable level variable frequency signal source, either modulated or un-modulated.

## NEW *Heathkit* BAR GENERATOR KIT

MODEL BG-1

**\$14.50**

SHIPPING WEIGHT  
6 POUNDS



The Heathkit BG-1 Bar Generator represents another welcome addition to the fast growing line of popular Heathkits. The station transmitted test pattern is rapidly disappearing, and the bar generator is the logical answer to the TV service man's problem in obtaining quick, accurate adjustment information without waiting for test patterns.

The Heathkit BG-1 produces a series of horizontal or vertical bars on a TV screen. Since these bars are equally spaced, they will quickly indicate picture linearity of the receiver under test. Panel switch provides "stand-by position" — "horizontal position" — "vertical position." The oscillator unit utilizes a 12AT7 twin triode for the RF oscillator and video carrier frequencies. A neon relaxation oscillator provides low frequency for vertical linearity tests. The instrument will not only produce bar patterns but will also provide an indication of horizontal and vertical sync circuit stability, as well as overall picture size.

Instrument operation is extremely simple, and merely requires connection to the TV receiver antenna terminal. The unit is transformer operated for safety when used in conjunction with universal or transformerless type TV circuits.

# HEATH COMPANY • Benton Harbor 15, Mich.



## NEW *Heathkit* TUBE CHECKER KIT

MODEL TC-2

**\$29<sup>50</sup>**

SHIP. WT. 12 LBS.

The new Model TC-2 Heathkit Tube Checker features many circuit improvements, simplified wiring, new roll chart drive and illumination of roll chart. The instrument is primarily designed for the convenience of the radio and TV service man and will check the operating quality of tubes commonly encountered in this type of work. Test set-up procedure is simplified, rapid, and flexible. Panel sockets accommodate 4, 5, 6, and 7 pin tubes, octal and locial, 7 and 9 pin miniatures, 5 pin Hytron and a blank socket for new tubes. Built-in neon short indicator, individual three-position lever switch for each tube element, spring return test switch, 14 filament voltage ranges, and line set control to compensate for supply voltage variations, all represent important design features of the TC-2. Results of tube tests are read directly from a large 4½" Simpson three-color meter, calibrated in terms of Bad?-Good. Information that your customer can readily understand. Checks emission, shorted elements, open elements, and continuity.

The use of closer tolerance resistors in critical circuits assures correct test information and eliminates the possibility of inaccurate test interpretation. Improvement has been made in the mechanical roll chart drive system, completely eliminating diagonal running, erratic operation, and backlash. The thumb wheel gear driven action is smooth, positive, and free running. As an additional feature, the roll chart is illuminated for easier reading, particularly when the tube checker is used on radio or TV home service calls.

Wiring procedure has been simplified through the extended use of multi-cable, color coded wires, providing a harness type installation between tube sockets and lever switches. This procedure insures standard assembly and imparts that "factory built" appearance to instrument construction. Completely detailed information is furnished in the new step-by-step construction manual, regarding the set-up procedure for testing of new or unlisted tube types. No delay necessary for release of factory data.

The new Heathkit Tube Checker will prove its value in building service prestige through usefulness—simplified operation—attractive professional appearance. Don't overlook the fact that the kit price represents a savings of \$40.00 to \$50.00 over the price of a comparable commercially built instrument. At this low price, no service man need be without the advantages offered by the Heathkit Tube Checker

### CHECK THESE NEW *Features*

- ✓ Simplified harness wiring
- ✓ Improved, smooth, anti-backlash roll chart action
- ✓ Optional roll chart illumination
- ✓ Individual element switches
- ✓ Portable or counter style cabinet
- ✓ Spare blank socket
- ✓ Contact type pilot light test socket
- ✓ Simplified test set-up procedure
- ✓ Line adjust control
- ✓ 4½" three-color meter

### New HEATHKIT

#### PORTABLE TUBE CHECKER KIT

MODEL TC-2P

**\$34<sup>50</sup>**

SHIP. WT. 14 LBS.



The portable model is supplied with a strikingly attractive two-tone cabinet finished in rich maroon, proxylin impregnated, fabric covering with a contrasting gray on the inside cover. Detachable cover, brass-plated hardware, sturdy plastic handle help to impart a truly professional appearance to the instrument.

PORTABLE TUBE CHECKER CABINET as described above will fit all earlier Heathkit TC-1 Tube Checkers. Shipping weight 7 lbs. Cabinet only, 91-8, \$7.50.



No. 355  
Ship. Wt. **\$4<sup>50</sup>**  
1 Lb.

#### *Heathkit* TV PICTURE TUBE TEST ADAPTER

The Heathkit TV Picture Tube Test Adapter used with the Heathkit Tube Checker will quickly check for emission, shorts, etc., and determine picture tube quality. Consists of standard 12 pin TV tube socket, four feet of cable, octal socket connector, and data sheet.

### *Heathkit* POWER SUPPLY KIT

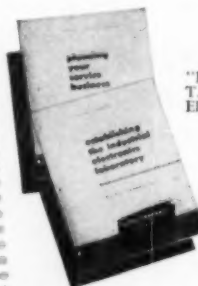


MODEL PS-2

**\$33<sup>50</sup>**

SHIPPING WT.  
17 LBS.

The Heathkit Laboratory Power Supply features continuously variable, regulated voltage output with good stability under wide load variations. A 4½" Simpson plastic enclosed panel mounted meter provides accurate meter output information of voltage or current. All panel terminals completely isolated from the cabinet. Separate 6.3 volt AC supply at 4 amperes for filament requirements. Ripple component exceptionally low, stand-by switch provided to eliminate warm-up time of the five tube circuit.



### LABORATORY AND SERVICE SHOP BOOKLETS

"Planning Your Service Business" by John T. Frye, and "Establishing the Industrial Electronics Laboratory" by Louis B. Garner, Jr., are booklets available to Heathkit customers at no charge. These booklets, written by nationally recognized authorities, outline the various requirements and considerations for establishing your own service business or for setting up an industrial electronics laboratory. Full attention is given to various details that are frequently overlooked when projects of this nature are undertaken. Just write in to the Heath Company requesting your free copy, or attach a memo to your next order.

**HEATH COMPANY • Benton Harbor 15, Mich.**

## CHECK THESE *Features*

- ✓ Visual and aural signal tracing
- ✓ Two channel input
- ✓ High RF sensitivity
- ✓ Unique noise locator circuit
- ✓ Calibrated wattmeter
- ✓ Substitution test speaker
- ✓ Utility amplifier
- ✓ RF, audio probes and test leads included

# Heathkit VISUAL-AURAL SIGNAL TRACER KIT

MODEL T-3

**\$23<sup>50</sup>**

SHIPPING WEIGHT  
10 POUNDS



An entirely new type of signal tracer incorporating a combination of features not found in any other instrument. Designed expressly for the radio and TV service man, particularly for the servicing of AM, FM, and TV circuits. Here in a five tube, transformer operated instrument are all of the useful functions so necessary for speedy, accurate isolation of service difficulty.

This new signal tracer features a special high gain RF input channel, used in conjunction with a newly-designed wide frequency range demodulator probe. High RF sensitivity permits signal tracing at the receiver antenna input. A separate low gain channel and probe available for audio circuit exploration. Both input channels are constantly monitored by an electron ray beam indicator, so that visual as well as aural signal indications may be observed. The instrument can also be used for comparative estimation of gain per stage.

A decidedly unusual feature is a noise localizer circuit in conjunction with the audio probe. With this system, a DC potential is applied to a suspected circuit component and the action of the

voltage in the component can be seen as well as heard. Invaluable for ferreting out noisy or intermittent condensers, noisy resistors, controls, coils, IF and power transformers, etc. A built-in calibrated wattmeter circuit is very useful for a quick preliminary check of the total wattage consumption of the equipment under test. Separate panel terminals provide external use of the speaker or output transformer for substitution purposes. Saves valuable service time by eliminating the necessity for speaker removal on every service job. The terminals also permit the utilization of other shop equipment, such as your oscilloscope or VTVM. The T-3 Signal Tracer can be used as a high gain amplifier for checking tuners, record changers, microphones, phono crystals, etc.

Don't overlook the interesting service possibilities provided through the use of this new instrument and let it work for you by saving time and money. The kit is supplied complete with all tubes, circuit components, demodulator probe, audio probe, and additional test leads.



## Heathkit DECADE RESISTANCE KIT

MODEL DR-1

**\$19<sup>50</sup>**

SHIP. WT.  
4 LBS.

The Decade Resistance Kit provides individual switch selection of resistance values using twenty 1% resistors providing a choice of 1 to 99,999 ohms in 1 ohm steps. Ceramic wafer switches, silver-plated contacts, smooth, positive detent action, baked enamel panel, and handsome, polished birch cabinet.

## Heathkit DECADE CONDENSER KIT

The Heathkit Decade Condenser Kit features silver mica, precision condensers with a rated accuracy of  $\pm 1\%$ . Capacity values are arranged in three decades from 100 mmf to .111 mf in steps of 100 mmf. Ceramic wafer switches with silver-plated contacts and smooth detent action. Useful in laboratory work, for circuit development.

MODEL DC-1

**\$16<sup>50</sup>**

SHIP WT.  
4 LBS.



## Heathkit RESISTANCE SUBSTITUTION BOX KIT

MODEL RS-1

**\$5<sup>50</sup>**

SHIP. WT.  
2 LBS.



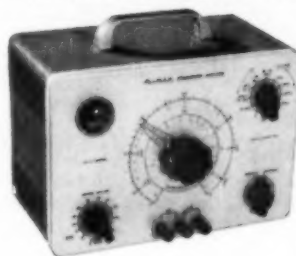
The Heathkit Resistance Substitution Box provides individual switch selection of any one of 36 RTMA 1 watt 10% standard value resistors, ranging from 15 ohms to 10 megohms. Many applications in circuit development work, and also in radio and TV service work. Ideal for experimentally determining resistance values and for quickly altering circuit operating characteristics. Entire unit housed in attractive Bakelite cabinet, featuring the new universal type Heathkit binding posts to simplify circuit connections.

## Heathkit CONDENSER CHECKER KIT

MODEL C-3

**\$19<sup>50</sup>**

SHIPPING WT.  
8 POUNDS



Use the Heathkit C-3 Condenser Checker to quickly and accurately measure those unknown condenser

and resistor values. All readings are taken directly from the calibrated panel scales without requiring any involved calculation. Capacity measurements in four ranges from .00001 mf to 1,000 mf. Checks paper, mica, ceramic, and electrolytic condensers. A power factor control is available for accurate indication of electrolytic condenser measurements. A leakage test switch with switch selection of five polarizing voltages, 25 volts to 450 volts DC, will indicate condenser operating quality under actual load condition. The spring return leakage test switch automatically discharges the condenser under test and eliminates shock hazard to the operator.

Resistance measurements can be made in the range from 100 ohms to 5 megohms. Here again all values are read directly on the calibrated scale. Increased circuit sensitivity coupled with an electron beam null indicator increases overall instrument usefulness.

For safety of operation the circuit is entirely transformer operated and the instrument is housed in the attractive, newly-styled Heathkit cabinet, featuring rounded corners, and drawn aluminum panel. The outstanding low kit price for this surprisingly accurate instrument includes necessary test leads. Good service shop operation requires the use of this specialized instrument, designed for the express purpose of determining unknown condenser values and operating characteristics.

# HEATH COMPANY • Benton Harbor 15, Mich.



## Heathkit AMATEUR TRANSMITTER KIT

MODEL AT-1

**\$29.50**

SHIPPING WEIGHT  
16 POUNDS

Here is the latest Heathkit addition to the ham radio field, the AT-1 Transmitter Kit, incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, stand-by switch, key click filter, AC line filtering, good shielding, etc. VFO or crystal excitation—up to 35 watts input. Built-in power supply provides 425 volts at 100 ma.

This kit features pre-wound coils, single knob band switching, 52 ohm coaxial output, plug in chassis provisions for VFO or modulator and rugged clean construction. Frequency range 80, 40, 20,

15, 11, and 10 meters. Tube line-up 6AG7 oscillator-multiplier, 6L6 amplifier-doubler, 5U4G rectifier. Physical dimensions 8 1/8" high x 13 1/8" wide x 7" deep.

This amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis, and detailed construction manual. The ideal kit for the novice just breaking into ham radio. It can be used later on as a stand-by rig or an all band exciter for higher powered transmitter.

### CHECK THESE NEW Features

- ✓ Single knob band switching
- ✓ Pre-wound coils
- ✓ Metered operation
- ✓ 52 ohm coaxial output
- ✓ Crystal or VFO excitation
- ✓ Built-in power supply
- ✓ Rugged, clean construction

## NEW Heathkit ANTENNA COUPLER KIT

New Heathkit Antenna Coupler, specially designed for the Heathkit AT-1 Transmitter. The Antenna Coupler can be used with any 52 ohm coaxial input—up to 75 watts power. Low pass filter with cut-off frequency of approximately 36 mc — L section tuning network — neon tuning indicator — rugged, compact construction — transmitter type variable condenser, and high Q coil are all outstanding features. The AC-1 has both inductance and capacity tuning for maximum operating versatility. Dimensions 8 1/8" wide x 4 3/8" high x 4 7/8" deep.



MODEL AC-1

**\$14.50** SHIP. WT.  
3 LBS.

## Heathkit ANTENNA IMPEDANCE METER

Use the Heathkit Antenna Impedance Meter for measuring antenna impedance for line matching purposes—adjustment of beam antennas—phone monitor, etc. It will determine antenna resistance at resonance, match transmission line for minimum SWR, determine receiver input impedance, and provide a rough indication of SWR. Precision resistors, germanium diode, 100 micro-ampere Simpson meter. Dial calibrated from 0-500 ohms. Shielded aluminum cabinet, 7" long x 2 1/2" wide x 3 1/4" deep.



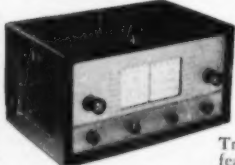
MODEL AM-1

**\$14.50**  
SHIP. WT. 3 LBS.

## Heathkit COMMUNICATIONS RECEIVER KIT

MODEL AR-2

**\$25.50** SHIP. WT.  
12 LBS.



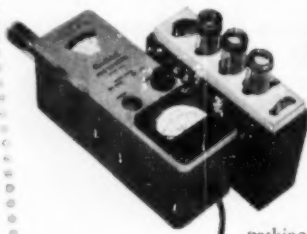
Here is the new receiver kit you have repeatedly asked for, the Heathkit Communications Receiver. The perfect companion piece for the AT-1 Transmitter kit. Many outstandingly desirable features have been incorporated in the design of the AR-2; such as, electrical bandspread

for logging and tuning convenience—high gain miniature tubes—IF transformers for high sensitivity and good signal to noise ratio—separate RF gain control with optional automatic volume control or manual volume control, in addition to the conventional audio gain control. Noise limiter—stand-by switch—stable BFO oscillator circuit—headphone jack—transformer operation, etc., all contribute to a high performance standard.

Frequency coverage is continuous from 535 kc to 35 mc in four ranges. For added convenience, various ham bands have been separately identified in respect to their relative placement on the slide rule tuning scale. A chassis mounted, 5 1/2" PM speaker is included with this kit. Tube line up 12BE6 mixer oscillator, 12BA6 IF amplifier, 12AV6 detector AVC audio, 12BA6 BFO oscillator, 12A6 beam power output, 5Y3GT rectifier.

### RECEIVER CABINET

Proxylon impregnated, fabric covered, plywood cabinet with aluminum panel designed expressly for the AR-2 Receiver. Part 91-10, shipping weight 5 lbs., \$4.50.



## IMPROVED Heathkit GRID DIP METER KIT

**\$19.50** SHIP. WT.  
4 LBS.

MODEL GD-1B

The invaluable instrument for service men, hams, and experimenters. Useful in TV service work for alignment of traps, filters, IF stages,

peaking compensation networks, etc. Locates spurious oscillation, provides a relative indication of power in transmitter stages, use it for neutralization, locating parasitics, correcting TVI, measuring C, L, and Q of components, and determining RF circuit resonant frequencies. With oscillator energized, useful for finding resonant frequency of tuned circuits. With the oscillator not energized, the instrument acts as an absorption wave meter. Variable meter sensitivity control, head phone jack, 500 microampere Simpson meter. Continuous frequency coverage from 2 mc. to 250 mc. Pre-wound coil kit and rack, new three prong coil mounting, 6AF4 high frequency triode.

Two additional plug-in coils are available and provide continuous extension of low frequency coverage down to 355 kc. Dial correlation curves included. Shipping weight 1 lb., kit 341, \$3.00.



**HEATH COMPANY • Benton Harbor 15, Mich.**

## CHECK THESE *Features*

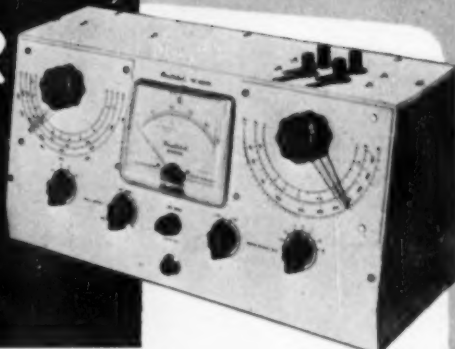
- ✓ First popular priced Q Meter
- ✓ Reads Q directly on calibrated scale
- ✓ Oscillator supplies RF frequencies of 150 kc to 18 mc
- ✓ Calibrate capacitor with range of 40 mmf to 450 mmf with vernier of  $\pm 3$  mmf
- ✓ Measures Q of condensers, RF resistance, and distributed capacity of coils
- ✓ Many applications in design and development work
- ✓ Useful in TV service work for checking deflection yokes, coils, chokes, etc.

## Heathkit "Q" METER KIT

MODEL QM-1

**\$44.50**

SHIPPING WT. 14 POUNDS



Another outstanding example of successful Heathkit engineering effort in producing a Q Meter Kit within the price range of TV service men, schools, laboratories, and experimenters. This Q Meter meets RF design requirements for rapid, accurate measurement of capacity, inductance, and Q at the operating frequency and all indications of value can be read directly on the meter calibrated scales. Oscillator section supplies RF fre-

quencies of 150 kc to 18 mc. Calibrate capacitor with range of 40 mmf to 450 mmf, with vernier of  $\pm 3$  mmf.

Particularly useful in TV service work for checking peaking coils, wave traps, chokes, deflection coils, width and linearity coils, etc. At this low kit price research laboratory facilities are within the range of service shops, schools, and experimenters.

## Heathkit INTERMODULATION ANALYZER KIT



MODEL IM-1

**\$39.50**

SHIPPING WT.  
17 POUNDS

The Heathkit IM-1 is an extremely versatile instrument specifically designed for measuring the degree of inter-action between two signals in any portion of an audio chain. It is primarily intended for making tests of audio amplifiers, but may be used in other applications, such as checking microphones, records, recording equipment, phonograph pick-ups, and loud-speakers. High and low test frequency source, intermodulation unit, power supply, and AC vacuum tube volt meter all in one complete instrument. Per cent intermodulation is directly read on the calibrated scales, 30%, 10%, and 3% full scale. Both 4:1 and 1:1 ratios of low to high frequency easily set up. With this instrument the performance level of present equipment, or newly developed equipment can be easily and accurately checked. At this low price, you can now enjoy the benefits of intermodulation analysis for accurate audio interpretation.

## Heathkit AUDIO GENERATOR KIT

A Heathkit Audio Generator with frequency coverage from 20 cycles to 1 mc. Response flat  $\pm 1$  db from 20 cycles to 400 kc, down 3 db at 600 kc, and down only 8 db at 1 mc. Calibrated, continuously variable, and step attenuator output controls provide convenient reference output level. Distortion is less than .4% from 100 cps through the audible range. The ideal controllable extended frequency sine wave source for audio circuit investigation and development.



MODEL AG-8

**\$29.50**

SHIP. WT. 11 LBS.

## Heathkit AUDIO OSCILLATOR KIT

Sine or square wave coverage from 20 to 20,000 cycles in three ranges at a controllable output level up to 10 volts. Low distortion, 1% precision resistors in multiplier circuits, high level output across entire frequency range, etc., readily qualify this instrument for audio experimentation and development work. Special circuit design consideration features thermistor operation for good control of linearity.

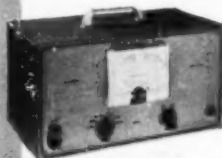


MODEL AO-1

**\$24.50**

SHIP. WT. 11 LBS.

## Heathkit AUDIO FREQUENCY METER KIT



MODEL AF-1

**\$34.50**

SHIP. WT. 12 LBS.

The Heathkit Audio Frequency Meter provides a simple and convenient means of checking unknown audio frequencies from 10 cycles to 100 kc at any voltage level between 3 and 300 volts rms with any non-critical wave shape. Instrument operation is entirely electronic. Just set the range switch, feed an unknown frequency into the instrument, and read the frequency directly on the calibrated scale of the Simpson 4 1/2" meter.

## Heathkit SQUARE WAVE GENERATOR KIT



MODEL SQ-1

**\$29.50**

SHIP. WT. 12 LBS.

The Heathkit Square Wave Generator provides an excellent square wave frequency source with completely variable coverage from 10 cycles to 100 kc. This generator features low output impedance of 600 ohms and the output voltage is continuously variable between 0 and 20 volts, thereby providing the necessary degree of operating flexibility. An invaluable instrument for those specialized circuit investigations requiring a good, stable, variable square wave source.

**HEATH COMPANY • Benton Harbor 15, Mich.**



## Heathkit WILLIAMSON TYPE AMPLIFIER KIT

MODEL W-2

Particularly designed for custom installations, featuring separate cable connected units for simplicity of installation. Sheet metal work finished in attractive gray hammer-tone for smart appearance. All control shafts of the adjustable length break-off type.

**\$69.50**

### PRICES OF COMBINATIONS

W-2 Amplifier Kit including main amplifier, power supply, and WA-P1 Preamplifier Kit. Shipping Weight 37 lbs. Shipped Express only. **\$69.50**

W-2M Amplifier Kit includes main amplifier and power supply. Shipping Weight 29 lbs. Shipped Express only. **\$49.75**

WA-P1 Preamplifier Kit only. Shipping Weight 6 lbs. Shipped Express or Parcel Post. **\$19.75**

When selecting an amplifier for the heart of your high fidelity audio system, investigate the outstanding advantages offered by the Heathkit Williamson Type Amplifier. Meets every high fidelity audio requirement and makes listening to recorded music a thrilling new experience.

This outstanding amplifier is offered with optional output transformer

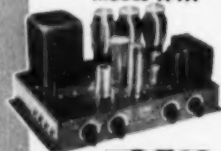
operation, providing either the conventional triode output circuit or the new extended power circuitry in which the screen supply voltage is obtained from separate transformer primary taps. Frequency response within  $\pm 1$  db from 10 cycles to 100 kc. Tube complement—6SN7 cascade amplifier and phase splitter, 6SN7 push pull driver, two 5881 push pull power amplifiers, one 5U4G cathode type rectifier.

Matching preamplifier available providing three switch selected inputs, correct compensation, and individual bass and treble tone controls. Uses 12AY7 (or 12AX7) preamplifier—12AU7 tone control amplifier.

Particularly designed for the novice kit builder and requires no specialized knowledge or equipment for successful assembly and operation.

## NEW Heathkit 20 WATT High Fidelity AMPLIFIER KIT

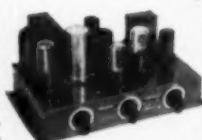
MODEL A-9A



**\$35.50**

SHIP. WT. 18 LBS.

A new 20 watt high fidelity amplifier, designed especially for custom audio installations demanding clean reproduction, adequate power, and flexibility to meet individual requirements. Separate treble and bass tone controls provide up to 15 db boost or cut. Four switch selected inputs, each with the necessary compensation for the service desired. Output transformer impedances of 4, 8, and 16 ohms. Preamplifier, tone control, and phase splitter circuits utilize 9 pin twin triode miniature tubes for low hum and noise level. Two 6L6 push pull power output tubes provide full 20 watts power. Frequency response  $\pm 1$  db, 20-20,000 cycles. Total harmonic distortion 1% (at 3 db below rated output). Tube line-up: 12AX7 preamplifier, 12AU7 voltage amplifier and tone control, 12AU7 voltage amplifier and phase splitter, two 6L6 push pull pentode power output, 5U4G rectifier. Truly outstanding amplifier performance coupled with low cost.



MODEL A-7B

**\$15.50**

SHIP. WT. 10 LBS.

The new Heathkit Model A-7B Amplifier offers many unusually fine features not normally expected in this low price range. Either of the two input circuits may be individually switch selected for phono or tuner operation. Separate bass and treble tone controls. Output impedances of 4, 8, and 15 ohms. Push pull beam power output stage for balanced reproduction. Excellent voltage gain characteristics, good frequency response, and full 6 watts power output. 12J5 amplifier, 12SL7 second amplifier and phase splitter, two 12A6 beam power output, one 5Y5 GT rectifier. A-7C incorporates preamplifier stage with special compensated network to provide necessary gain for operation with variable reluctance or low output level phono cartridge. Circuit is properly compensated for microphone operation. \$17.50.

## NEW Heathkit BROADCAST BAND RECEIVER KIT

Another new Heathkit for the student, beginner, or hobbyist. If you have ever had the urge to build your own radio receiver, this kit warrants your attention.

New high gain miniature tubes and IF transformers provide excellent sensitivity and good signal to noise ratio. A built-in ferrite core rod type antenna has been provided. A chassis mounted  $5\frac{1}{2}$ " PM speaker provides excellent tone and volume. Convenient phono input. Can be operated either as a receiver or tuner. Simplified construction manual outlines circuit theory. Ideal for students. Tube line-up: 12BE6 mixer oscillator, 12BA6 IF amplifier, 12AV6 detector-AVC-first audio, 12A6 beam power output, 5Y3GT rectifier.



MODEL BR-2

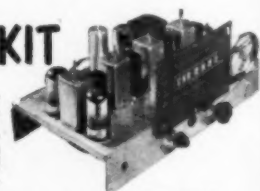
**\$17.50**

SHIP. WT. 11 LBS.

CABINET—Proxylin impregnated fabric covered plywood cabinet. Shipping weight 5 lbs. Part number 91-9, \$4.50.

## Heathkit FM TUNER KIT

The Heathkit FM-2 Tuner was specifically designed for simplified kit construction. Can be operated through the "phono" portion of your radio or with a separate amplifier. The kit features a pre-assembled and adjusted tuning unit, three double tuned IF transformers, and a discriminator transformer in an 8 tube AC operated circuit. Frequency coverage 88 to 108 mc. Experience the thrill of building your own FM tuner and at the same time enjoy all of the advantages of true FM reception.



MODEL FM-2

**\$22.50**

SHIP. WT. 9 LBS.

### Free CATALOG

Write for free catalog containing latest price information, schematics, specifications, and descriptions of all Heathkits.

**HEATH COMPANY • Benton Harbor 15, Mich.**

- ✓ Plays all record sizes, all speeds
- ✓ Newly developed ceramic cartridge
- ✓ Automatic shut-off for both changer and amplifier
- ✓ Acoustically correct cabinet enclosure
- ✓ Modern attractive styling
- ✓ Two 6" PM matched speakers
- ✓ Compensated volume control
- ✓ Easy to assemble

MODEL RP-1

**\$59.50**

SHIPPING WT. 30 LBS.



Record Changer plays all sizes—all speeds—automatic shut-off for changer and amplifier after the last record is played. A wide tonal

Simplified, easy-to-assemble, four tube amplifier features compensating volume control and separate tone controls. Proxylon impregnated fabric covered cabinet supplied completely assembled. Kit also build only the amplifier from step-by-step construction. No special tools or knowledge required, as full recognition has been given to the fact that many purchasers of this kit enjoy good musical reproduction on a purely non-technical basis, and the construction manual has been simplified to the point where even the complete novice can successfully construct the Heathkit Dual. The price of the Heathkit Dual includes cabinet. — Reader Changer, two 6" PM speakers, tubes, and all circuit components required for amplifier construction.



MAIL YOUR ORDER  
TODAY TO THE  
**HEATH COMPANY**  
BENTON HARBOR 15,  
MICHIGAN

OR PHONE  
BENTON 5-1175

From

SHIP VIA

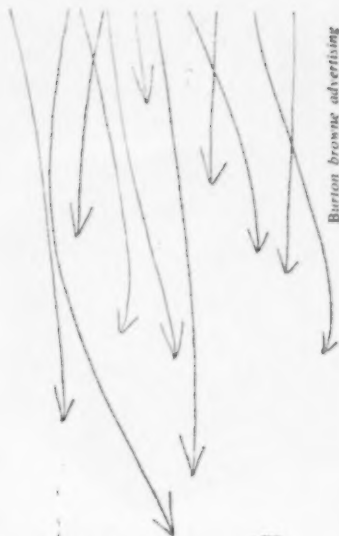
☐ Parcel Post  
☐ Express  
☐ Freight  
☐ Best Way

PLEASE PRINT

[illegible]

Enclosed find ( ) check ( ) money order for  
Please ship C.O.D. ( ) postage enclosed for \_\_\_\_\_ pounds.

On Express orders do not include transportation charges — they will be collected by the express agency at time of delivery.



Burton Browne advertising

**Bob Henry**  
to all radio hams and hobbyists—  
**Over!**

Yes—you're at the controls when you do business with Bob Henry! As one radio fan to another, Bob knows what equipment and services you want—and he's made both his stores to-the-order of the radio ham or hobbyist. Dealing with Bob, you get 90 days FREE service—really liberal trade-ins—and a payment plan that just can't be matched! Write, wire, phone or visit either store today. Find out all the "extras" you get with Bob Henry—the world's largest distributor of short wave receivers.

**Bob Henry has**  
a complete line of new Hallicrafter receivers and transmitters.



**MODEL SX-71...** Double superheterodyne circuit plus built-in Narrow Band FM reception. Temperature compensated, voltage regulated, 5 position band selector for 538-1650 Kc, 1600-4800 Kc, 4.6-13.5 Kc, 12.5-35 Mc, 46-56 Mc. 11 tubes plus voltage regulator and rectifier, \$224.50.

Also available — Hallicrafters Model HT-20, \$449.50 • Model S-76, \$179.50 • Model SX-62, \$299.50 • And all other models.

#### **HENRY RADIO STORES**

LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS  
LOS ANGELES OFFICE: 11240 Olympic Blvd.,  
Los Angeles 64. BRadshaw 2-2917  
BUTLER OFFICE: Butler 1, Missouri. Phone: 395  
**102**

## **WHAT'S**

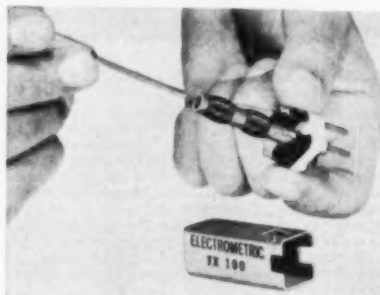
# *New in Radio*

The products described in this column are for your convenience in keeping up-to-date on the new equipment being offered by manufacturers. For more complete information on any of these products, write direct to the company involved.

### **MINIATURE I.F.**

The ability to tune both coils from the same end is one of the unique features of a new miniature i.f. transformer now available from *Electrometric Company* of Woodstock, Illinois.

Known as the Type TX100, the new unit permits both coils to be tuned



either from the top or from the bottom. This permits faster set alignment, reducing set production costs. It also results in greater freedom of radio chassis design.

The new unit can be used for any application requiring a  $\frac{1}{4}$ " i.f. transformer. It is available in a wide range of inductances and "Q's" for AM, FM, TV, and military applications.

### **SUBMINIATURE LIGHTS**

A new subminiature indicator or warning light for use on either standard or edge-lighted panels and featuring wide-angle visibility is now being marketed by *Hetherington, Inc.* of Sharon Hill, Pa.

Requiring only  $\frac{1}{8}$ " depth behind the panel exclusive of contact, the new lamp is known as the Series L6000. It uses a standard AN-3140 lamp which extends farther into the long plastic lens than is the case with conventional indicator lights. A unique inside beveling of the plastic serves to "pipe" the light through the lens so that its periphery is illuminated.

Bulletin L6000 giving complete details is available on request.

### **NEW V.T.V.M.**

*Freed Transformer Company*, 1718 Weirfield St., Brooklyn 27, New York is now offering a new a.c. vacuum-tube voltmeter, the Model 1040.

The unit has a high input impedance and wide frequency range, and can be used at audio and ultrasonic frequencies. It is particularly well adapted to making vibration studies involving low frequencies, frequency characteristic and gain measurements on amplifiers, measuring transmission

losses in telephone circuits, and making acoustic measurements such as determination of frequency response of microphones and loudspeakers. It can also be used as a null detector in a.c. bridge measurements.

The Model 1040 weighs 12 pounds, stands  $4\frac{1}{2}$ " high, is  $5\frac{1}{2}$ " wide and  $9\frac{1}{2}$ " long. It operates on 100-125 volts, 50-60 cycles. It has a logarithmic voltage scale calibrated from 1 to 10 plus a linear decibel scale calibrated from zero to 20 db.

### **8½" SCOPE**

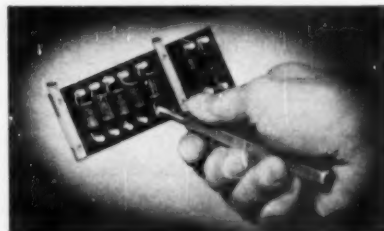
*Precise Development Corp.*, 999 Long Beach Road, Oceanside, N. Y. is now offering an 8½" oscilloscope which is available in either kit or wired form.

The Model #308 uses an 8CP1 tube, is voltage regulated, and uses a higher accelerating potential than the company's previous 7" model. The instrument features a "low-normal-high frequency synchronization circuit" which enables the user to select between high and low frequency. The circuit itself is switch controlled.

### **PRODUCTION TOOL**

*Contact, Inc.*, 238 Main Street, Cambridge, Mass. is now in production on a new tool for wrapping wire around terminals.

The "Wire-Wrench" can be used for wrapping either stranded or solid wire around terminals on a board or hermetic seals. One or more wires can be wrapped with a single twist of the wrist. The unit also has, as an auxiliary feature, a drilled hole and a



milled flat to be used for putting a hook in a wire whenever needed.

Sizes for miniature, medium-size, and large terminals are currently available.

### **DIODE TEST SET**

*Electronics Production Service Co.*, 871 Washington St., Canton, Mass. has recently developed a new instrument for testing and evaluating miniature and power germanium or selenium rectifiers.

The Model D102 is capable of testing these units under actual operating

**RADIO & TELEVISION NEWS**

**NO  
INTEREST!!**

# Buy on our radically new Time Payment Plan

**NO CARRYING  
CHARGES!!**



Measures 6 1/4" x 9 1/2" x 4 1/2"

Superior's new  
Model 670-A

## SUPER METER

A COMBINATION VOLT-OHM MILLIAMMETER PLUS  
CAPACITY REACTANCE INDUCTANCE AND DECIBEL MEASUREMENTS

### SPECIFICATIONS:

D.C. VOLTS: 0 to 7.5/15/75/150/750/1,500/7,500 Volts  
A.C. VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts  
OUTPUT VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts  
D.C. CURRENT: 0 to 1.5/15/150 Ma. 0 to 1.5/15 Amperes  
RESISTANCE: 0 to 1,000/100,000 Ohms 0 to 10 Megohms  
CAPACITY: .001 to 1 Mfd. 1 to 50 Mfd. (Quality test for electrolytics)  
REACTANCE: 50 to 2,500 Ohms, 2,500 Ohms to 2.5 Megohms  
INDUCTANCE: .15 to 7 Henries 7 to 7,000 Henries  
DECIBELS: -4 to +18 +14 to +38 +34 to +58

### ADDED FEATURE:

The Model 670-A includes a special **GOOD-BAD** scale for checking the quality of electrolytic condensers at a test potential of 150 Volts.

The Model 670-A comes housed in a rugged, crackle-finished steel cabinet complete with test leads and operating instructions.

**\$28<sup>40</sup>**  
NET



Superior's new  
Model TV-11

## TUBE TESTER

### SPECIFICATIONS:

- ★ Tests all tubes including 4, 5, 6, 7, Octal, Lock-in, Peanut, Bantam, Hearing Aid, Thyatron, Miniatures, Sub-Miniatures, Novals, Sub-minars, Proximity fuse types, etc.
- ★ Uses the new self-cleaning Lever Action Switches for individual element testing. Because all elements are numbered according to pin-number in the RMA base numbering system, the user can instantly identify which element is under test. Tubes having tapped filaments and tubes with filaments terminating in more than one pin are truly tested with the Model TV-11 as any of the pins may be placed in the neutral position when necessary.
- ★ The Model TV-11 does not use any combination type sockets. Instead individual sockets are used for each type of tube. Thus it is impossible

to damage a tube by inserting it in the wrong socket.

- ★ Free-moving built-in roll chart provides complete data for all tubes.
- ★ Newly designed Line Voltage Control compensates for variation of any Line Voltage between 105 Volts and 130 Volts.
- ★ **NOISE TEST:** Phono-jack on front panel for plugging in either phones or external amplifier will detect microphonic tubes or noise due to faulty elements and loose internal connections.

The model TV-11 operates on 105-130 Volt 60 Cycles A.C. Comes housed in a beautiful hand-rubbed oak cabinet complete with portable cover

**EXTRA SERVICE**—The Model TV-11 may be used as an extremely sensitive Condenser Leakage Checker. A relaxation type oscil-

lator incorporated in this model will detect leakages even when the frequency is one per minute.

**\$47<sup>50</sup>**  
NET



Superior's New Model 660-A AN AC OPERATED

## SIGNAL GENERATOR

PROVIDES COMPLETE COVERAGE for AM-FM & TV Alignment

### SPECIFICATIONS:

• Generates Radio Frequencies from 100 Kilocycles to 60 Megacycles on fundamentals and from 60 Megacycles to 220 Megacycles on powerful harmonics. • Accuracy and Stability are assured by the use of permeability trimmed Hi-Q coils. • R.F. available separately or modulated by the internal audio oscillator. — Built in 400 cycle sine wave audio oscillator used to modulate the R.F. signal also available separately for audio testing of receivers, amplifiers, hard of hearing aids, etc. • R.F. Oscillator Circuit: A

high transconductance heptode is used as an R.F. oscillator, mixer and amplifier. Modulation is effected by electron coupling in the mixer section thus isolating the oscillator from load changes and affording high stability. • A.F. Oscillator Circuit: A high transconductance heptode connected as a high- $\mu$  triode is used as an audio oscillator in a High-C Colpitts Circuit. The output (over 1 Volt) is nearly pure sine wave. • Attenuator: A 5 step ladder type of attenuator is used.

Tubes used: 1—6BE6 as R.F. Oscillator, mixer and amplifier. 1—6BE6 as Audio Oscillator. 1—6H6 as Power Rectifier.

**\$42<sup>95</sup>**  
NET

The Model 660-A comes complete with coaxial cable test lead and instructions.

MOSS ELECTRONIC DISTRIBUTING CO., INC.  
Dept. B-87, 38 Murray St., New York 7, N. Y.

Please send me the units checked. I am enclosing the down payment with order and agree to pay the monthly balance as shown. It is understood there will be no carrying interest or any other charges provided I send my monthly payments when due. It is further understood that should I fail to make payment when due, the full unpaid balance shall become immediately due and payable.

Name.....

Address.....

City.....Zone.....State.....

- ☐ MODEL 670-A ..... Total Price \$28.40 \$7.40 down payment. Balance \$3.60 monthly for 6 months.
- ☐ MODEL TV-11 ..... Total Price \$47.50 \$11.50 down payment. Balance \$6.00 monthly for 6 months.
- ☐ MODEL 660-A ..... Total Price \$42.95 \$12.95 down payment. Balance \$6.00 monthly for 6 months.
- ☐ I enclose \$..... as down payment.
- ☐ Ship C.O.D. for the down payment.



# SERVICEMEN THE WORLD OVER ACCLAIM THE NEW Precise OSCILLOSCOPE

A FULL 7 1/2" or 8 1/2" SCOPE  
NO OTHER KIT IN THE WORLD LIKE IT

THE OSCILLOSCOPE YOU'VE BEEN SEEKING  
AVAILABLE IN BOTH KIT AND WIRED FORM

NO OTHER OSCILLOSCOPE AT ANY PRICE  
HAS ALL THESE DESIRABLE FEATURES



## PRECISE MODEL 308

1. Full 8 1/2" tube designed specially for this model.
2. Voltage regulation.
3. High frequency—Low frequency—Normal frequency Synchronization Circuit.
4. Separate intensifier anode.
5. Deluxe version of Model 300K.

### Precise Model 308 Specifications

**VERTICAL**—Vertical-flat (3db) DC through 5 megacycles with sensitivity of greater than 10 millivolts push-pull (3.54 Millivolts/cm); Com. scan Resistance; Push-pull input immediately converted to single-ended normal or reverse phase by shorting bar at inputs 1 and 2; Frequency compensated vertical stepping attenuator selects AC or DC inputs; Push-pull DC amplifiers from input through output; Internal electronic mixing through inputs 1 and 2; five-way binding posts.

**POSITIONING**—Bridge type positioning on vertical and horizontal does not vary tube characteristics.

**HORIZONTAL**—Frequency compensated stepping attenuator in horizontal amplifier; Push-pull Horizontal out.

**BLANKING**—Internal (return trace blanked), external (return trace not blanked), 60 cycle or 120 cycle Blanking through Blanking amplifier circuit.

**SYNCHRONIZATION**—External, Internal Positive, Internal Negative, Internal 60 cycle or Internal 120 cycle synchronization.

**SWEEP RATE**—Driven or non-driven linear sweeps from 1 cycle to 80KC in five ranges (1-10 cycles uses external C circuit); Tripper potentiometer.

**MAGNIFIER**—Electronic magnifier and magnifier potentiometer allows any part of a signal to be magnified up to ten times (equivalent to 70 inches of horizontal deflection).

**CALIBRATION**—Internal square wave calibrator and potentiometer for using oscilloscope at a VTVM on Peak to Peak measurements.

**CALIBRATION SCREEN**—Edge-illuminated scale and graticule may be turned on or off; filtered screen.

**OUTPUTS ON FRONT PANEL**—Plus Gate output; Sawtooth output; 60 cycle phasing output; 60 cycle unphased output; Calibration output.

**FOCUSING**—Astigmatism, focus and intensity control.

**CRT**—NEW 7" Tube, normally supplied is medium persistence type 7VP1, or 7JP1 may also be used (oscilloscope green trace)—high persistence types available at additional cost.

**DIRECT**—Deflection plates available from rear of cabinet.

**INTENSITY MODULATION**—Z modulation through modulation amplifier.

**GENERAL**—Low loss components; Over-designed fused power supply for additional circuitry; Deeply etched aluminum panel; New parts from original manufacturers—(NO SURPLUS); Steel cabinet, 11" x 14" x 19"; complete with instruction book and all components; Accessories: Model 912T(NM) Demodulator Probe and Model 960 Capacity Attenuator Probe available at extra cost.

There are many additional features and circuits in Kit Form which may be added to Model 308. Write for descriptive literature.

300K—Kit Form .....\$129.95 300—WB—Factory Wired .....\$199.50

300W—Factory Wired .....\$239.50 300KB—Kit Form .....\$54.95

(2 months deliv.)

MODEL 300—Full 7" scope with the same features as Model 308K above except without first five features but with New Cadmium plated chassis and simplified wiring design. Size is 11" x 14" x 17".

## Introducing THE HOTTEST CONVERTERS FOR ANY UHF TERRITORY



The METROPOLITAN by SUTTON For use in the Primary or A Coverage Area only of a UHF Station. Check these features:

1. Adds all UHF Channels to every TV receiver
2. All VHF channels remain open
3. Designed for simple operation
4. Absolutely no additional adjustments required on receiver

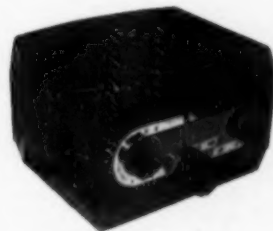
5. To install, connect only UHF antenna and lead to receiver
6. Turns on automatically with set
7. Compactly built with attractive plastic cabinet

List price .....\$29.95 ea.  
Dealer Net .....\$21.95 ea.

### The SUTTON BOOSTER-CONVERTER No. 228

A combination VHF booster & UHF converter in one compact unit. Enables ANY TV Receiver now being manufactured to receive UHF signals and have the booster necessary for VHF in fringe areas. Has its own power supply, a crystal mixer and two tubes, a 6AF4 & 6J6. Terminals at back of unit provide connections for both VHF & UHF antenna. Unit is installed by simply connecting the antenna wire from the receiver to the terminal board at the back of the unit.

List price .....\$59.50 ea.  
Dealer Net .....\$35.00 ea.



SEND FOR COMPLETE CATALOG  
on Precise Test Equipment and  
Sutton Converters.

Send 20% deposit with order, balance C.O.D., or check or money order in advance.

**TEE-VEE**  
*Supply Co.*

3211-13 Washington Street  
Jamaica Plain 30, Mass.

# **TRIO** *practically announces*

# **"TWIN-SIX"**

(A significant addition to the Zig-Zag line)

## **The New ZIG-ZAG**

... the greatest advance ever made in ALL-CHANNEL antenna design!

Not content to bring out just another all-channel antenna, TRIO studied and tested every other model available. Months of research produced the "Twin-Six", a Zig-Zag that provides all of the desirable features indicated above. Quantitative ratings for antennas are practically meaningless because of some exaggerated claims. For this reason, the "Twin-Six" is announced without the usual gain chart. The new "Twin-Six", however, equals and, in most cases, greatly exceeds the gains of these antennas on every channel. For instance, the "Twin-Six" showed a 2 to 6 db higher gain than a competitive antenna which is advertised as having a 12 db gain.

#### MINUTE-UP ASSEMBLY

There's no antenna easier to assemble. Shipped with all hardware mounted on the boom. Complete assembly consists of matching elements to color coded insulators and snapping on spring clips. Improper assembly impossible.



Insulators come mounted on boom and are so designed that "snapping-on" is impossible. No loose elements, no need for any special tools or spring clip.



Pre-assembled boom elements are snapped into position and quickly locked by using insulators.



Team the new Zig-Zag "Twin-Six" with the dependable TRIO rotor for the maximum in TV enjoyment.

### NEW ZIG-ZAG "TWIN-SIX" OFFERS:

Measurable Higher Gain On All VHF Channels Than Any Other Single Bay All-Channel Antenna

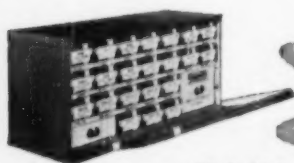
#### PLUS

1. One Horizontal Bay Does It All!
2. Single Lead-In Operation!
3. Easy-Up, One Minute Assembly!
4. Rugged Construction Throughout — No Droop, No Sag! Light Weight — Attractive Appearance!
5. UHF Reception For All Primary Areas!
6. Low Standing Wave Ratio!
7. Built and Backed by TRIO — A Name You Can Trust!
8. Competitively Priced!

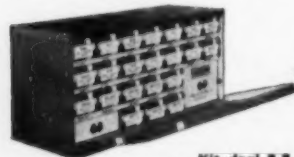


# Follow this path to faster, more profitable repair service

If you're like thousands of other busy Service Engineers, you can't afford to sacrifice profit time — hunting for repair parts. That's why it pays to have your Centralab controls on hand when you need 'em — in one of these 3 handy Blue Shaft Control kits. Assortments contain exact replacement values you use every day, in plain or switch types, for popular radio and TV sets!



**Kit deal B-A**  
contains 22 controls (8 types) in 1/2 and 1 megohm. All units C<sub>2</sub> audio taper. Standard full-length fluted mill and split-knurled shafts.



**Kit deal B-B**  
newest, revised. Has 22 controls (15 C<sub>2</sub> types, —1000 ohms to 5 megs) plus 4 Fastatch® type KB line switches.



**Handy Plastic-Paks**  
of 12 controls each in 10 fast moving assortments. You pay for parts only — no charge for metal or plastic containers.

And remember . . . switches are factory-attached and tested for immediate installation. Your Centralab distributor has plenty of Blue Shafts on hand to keep kits well-stocked. Order kits from him NOW.

\*Trademark

## Centralab

**CENTRALAB**  
A Division of Globe-Union Inc.  
910-L E. Keefe Ave., Milwaukee 1, Wis.  
Please send me Catalog 28 with complete details on Centralab Radio-TV control kits.

Name \_\_\_\_\_  
Firm \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## International Short-Wave (Continued from page 86)

**British Guiana**—ZFY, 5.981, Georgetown, noted 1630-2045, fair level. (Sawyer, Ont.; Lund, Iowa, others)

**British Honduras**—When this was compiled, Belize, 3.300, was being heard well in its evening (EST) schedule, except for CWQRN; lists schedule as 1300-1500 and 1900-2200 weekdays; *Sun.* sign-on is 1200 to include church services; news and weather at 2000, in Spanish 2010; BBC news relay from London 2100; seems to have musical programs mostly 2015-2100 and 2115V-2158; at 1930 has BBC play; for the 1900-2200 period announces 1230 kc., 3.300, and 4.950; may use 6.100 instead of 3.300 for the 1300-1500 session; identifies mostly now as "This is BHBS," and sometimes also with "The British Honduras Broadcasting Service." May remain on air longer during hurricane season to give weather forecasts. (McEwen, S.C.; Ferguson, N.C.; West, Va.; Hyson, Md., others)

**British New Guinea**—VLT6, 6.130, Pt. Moresby, is fair level 0410 when giving news. (Saylor, Va.)

**Bulgaria**—Radio Sofia, 7.671, noted with news when tuned 1640 recently; ended *English* 1643 and continued in Bulgarian; also heard 2340 in Bulgarian. (Ferguson, N.C.) Noted in Wyo, closing *English* 1945. (Brown) On *Sun.* only, Radio Tirana, is relayed by Sofia at 1930-2000 on 9.700; this broadcast is not direct from Tirana as has been reported. (Sawyer, Ont.)

**Canada**—CFVP, 6.030, Calgary, Alta., noted 0020. (Niblack, Ind.) VED, 7.32, and VE9AI, 9.54, both Edmonton, Alta., are usually good around 2000. (Morgan, Calif.) CHNX, Halifax, N.S., lists schedule 0600-2315 *Mon.-Sat.*, 0800-2315 *Sun.*, on 6.130. (Mitchell, N.Y.) The International Service of CBC is sending out a highly attractive new QSL card.

**Ceylon**—Colombo noted relaying VOA on 9.57 at 1100. (Patrick, England) Radio Ceylon's Commercial Service, 11.975, is good level around 0950 in *English*. (Barnard, Calif.)

**China**—Radio Peking has been noted on 15.060A around 1930 lately with fair level in native. (Ferguson, N.C.) Heard on 7.500 at fair to good level from 0430 tune-in to 0530 when gets bad QRM; the 6.200A outlet is fair level at 0445. (Saylor, Va.) Heard weakly with *English* on 11.690A at 0840-0850. (Scheiner, N.J.) Noted 0400 with news over 10.260. (Sanderson, Australia)

**Colombia**—A Colombian on 5.979A, which seems to give calls of HJBO, HJBE, is noted in Spanish to around 2300 closedown; location not yet known. (Niblack, Ind.; Bellington, N.Y.) HJEX, 6.045, Cali, Radio Pacifico, has strong signal 1800-2200 closedown; has classical music *Sun.*; all-Spanish. (Diaz, Ind.) HJKD, 6.000, Bogota, on *Sun.* appears to have the NBC-transcribed program "Manhattan

Merry-go-round" (*English*) at 2000-2030. (Bellington, N.Y.)

**Cuba**—Radio Salas, COBZ, 9.037, Havana, noted 2344-0031; all-Spanish. (Roberts, Conn.) The Cuban on 9.62A is definitely COJK; noted with call in Spanish at 1809. (Bellington, N.Y.) Gave location as Camaguey at 0930. (Ferguson, N.C.) Circuito CMQ noted 2207-2239 on 9.670 in Spanish. (Hyson, Md.)

**Dominican Republic**—HI8Z, 5.030, noted 2100 in Spanish. (URDXC) One of the calls of the station on 3.375 given 1959A appears to be HI4V. (Bellington, N.Y.)

**Dutch New Guinea**—Hollandia moved back to 5.045 from 4.865 and is heard in Australia at good strength 0430-0700. (Williams)

**Ecuador**—HCJB, 9.745 is good signal around 2130-0030. (Morrill, N.H.)

**Egypt**—When this was written, Cairo's new 100 kw. transmitter, formerly on 9.615, was moving around the 31-m. band and at press time had been measured on 9.475 with a schedule of 1320-1700, with news 1330. (Ferguson, N.C.; West, Va.; Bellington, N.Y., others) The 11.815 outlet is strong in Paris around 1600 but sometimes has CWQRN. (Buret, France)

**El Salvador**—QRA for Radiodifusora "La Voz Panamericana," YSAX, 11.950 and 800 kc., is 2a. Avenida Norte 25, San Salvador. (Gay, Calif.) YSC is back on 6.137 again from 6.078. (Stark, Texas)

**England**—BBC's European Service, 3.970, noted signing on in *English* 1330. (Pearce, England)

**Fiji Islands**—ZJV3, 3.980, Suva, noted 0400 with news, music; good level in Australia. (Sanderson)

**Finland**—OIX4, 15.190, Helsinki, still opens in *English* 1430 for North America, with news and press review. (Crowell, Pa.) Heard opening on this channel 0640 with news in Finnish; *English* news 0700. (Sanderson, Australia)

**France**—Paris, 15.24, noted at good level 1600 in French. (Bush, Chile) *English* for Britain noted on 6.045 at 1500-1600, news at start. (Pearce, England) Heard to Latin America 1800-1815 on 9.685, 11.700. And to Britain on 7.245 at 0145 with "The French Have a Word for It" (*English-French* lesson). (Sawyer, Ont.)

**French Equatorial Africa**—Radio Brazzaville, 11.97, 9.44, noted 1345-1400 with "The French Have a Word for It" (*English-French* lesson) for *English*-speaking listeners. (Pearce, England) Is good level on 11.97 with news 1645-1700. (Gillette, Ky.)

**French West Africa**—Radio Dakar, 9.560, noted with news in French 1700, closing with "La Marseillaise" 1717A. (Pearce, England) Heard on 4.950 parallel 11.895A at nice level from 0130 sign-on. (Saylor, Va.)

**Germany**—NWDR, 5.980, Hamburg, tuned 1045 when had dance music. (Pearce, England) Cologne, 7.29, noted closing 0030 in *English*, French, German; fair level in Ont. (Sawyer) Leipzig, 9.73, noted with news in Ger-

THE BEST SET IS ONLY AS GOOD AS ITS ANTENNA!

# The KAY-TOWNES "BIG JACK" IS *not* A NEW ANTENNA

The "BIG JACK", recognized even by competitive manufacturers as the best performing VHF antenna design ever developed HAS BEEN ON THE MARKET FOR MORE THAN 1½ YEARS!

**WE  
CHALLENGE**

any other manufacturer  
who claims this design  
as his original  
idea!

HIGH GAIN ON ALL VHF CHANNELS  
PREASSEMBLED

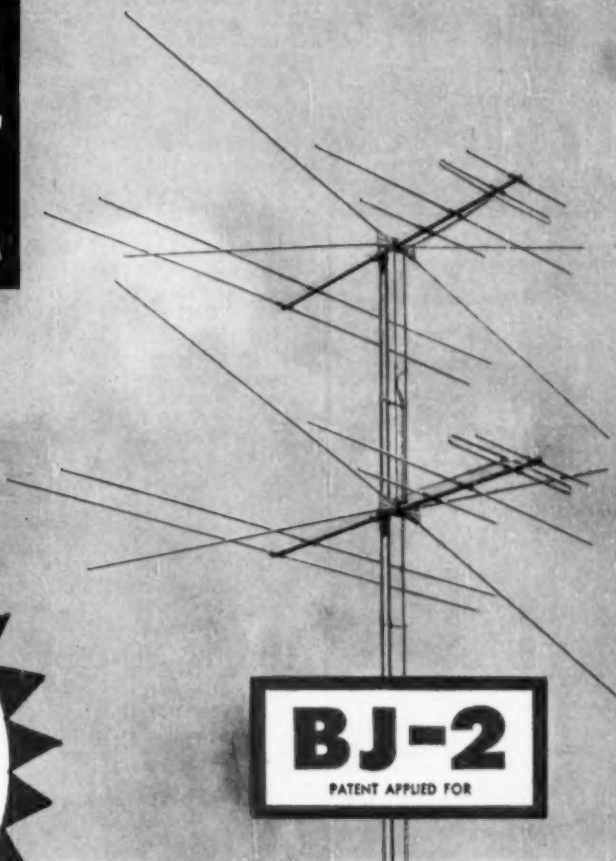
1" HEAVY ALUMINUM BOOM

CRIMPED & DOWEL REINFORCED  
HEAVY (7/16" O.D.) ALUMINUM  
TUBING

"SURE-GRIP" CAST ALUMINUM MAST  
CLAMP WILL NOT SPREAD, BEND OR  
COLLAPSE.

Kay-Townes Antennas and Accessories  
are sold only through selected whole-  
sale outlets . . . Contact your jobber or  
write for name of nearest distributor.

Copyright 1953



## KAY-TOWNES' "BIG JACK" ANTENNAS PERFORM WITH OUTSTANDING SUCCESS WHERE OTHERS FAIL!

Kay-Townes technical experience and engineering details plus careful manufacture, all combine to make "BIG JACK" the most advanced antenna on the market today. As a matter of fact, certain other manufacturers who have failed to come up with matching performance in antennas of their own design, have attempted to copy the "BIG JACK" design, with questionable results.

HUNDREDS OF STATEMENTS LIKE THE ONE REPRODUCED  
HERE, PROVE "BIG JACK'S" SUPERIORITY!

Dear Sirs:

I have one of your BJ-2 "Big Jack" Antennas, which was installed approximately 2 months ago. It has consistently proved vastly superior to any other antenna in this locality. I have nothing but praise for this well made, expertly designed antenna. We receive WSB-TV, Atlanta, channel 2, 165 miles away better than everyone else around here. WAGA-TV, Atlanta, channel 5, and WBTV, Charlotte, channel 3, also come in clear and sharp.

James R. Rule  
Oak Ridge, Tennessee

# KAY-TOWNES ANTENNA CO. ROME, GEORGIA

*Recognized leaders in the field of fringe area antenna design*

# MAKE THIS A Special Xmas WITH A NEWARK Special

RCA WV-97A. Senior Volt Ohmyst.	
62F000. Shpg. wt., 10 lbs.	67.50
RCA WV-77A. Junior Volt Ohmyst.	
62F010. Shpg. wt., 6 lbs.	47.50
Triplet 666-HH. Volt-ohm-milliammeter.	
62F208. Shpg. wt., 3 lbs.	24.01
Triplet 630. Volt-ohm-milliammeter.	
62F212. Shpg. wt., 4½ lbs.	38.71
Simpson 260. Set Tester (Roll Top).	
62F303. Shpg. wt., 9 lbs.	45.96
Simpson 260. Set Tester (Open Face).	
62F300. Shpg. wt., 5 lbs.	36.17
Millen 90651. Popular Grid Dip Meter.	
97F208. Shpg. wt., 3½ lbs.	61.50
Hallcrafters 639C. All-wave Receiver.	
99F005. Shpg. wt., 14 lbs.	59.95
Hallcrafters 540B. Communications Receiver. Covers 540 kc to 43 mc.	
99F003. Shpg. wt., 33 lbs.	129.95
National 5W-54. Superhet Communications Receiver. Covers 540 kc to 30 mc.	
99F318. Shpg. wt., 10 lbs.	59.95
National NC-88. New Communications Receiver. Covers 540 kc to 40 mc.	
99F312. Shpg. wt., 30 lbs.	129.95
Newark Portable 3-Spd Record Changer.	
73F910. Shpg. wt., 23 lbs.	47.50
Newark Portable 3-Speed Phonograph.	
73F903. Shpg. wt., 9 lbs.	22.50
Dorset. High Fidelity Portable 3-Spd Record Changer with Garrard RC-80.	
73F905. Shpg. wt., 30 lbs.	129.50
Garrard RC-80. 3-Speed Record Changer.	
73F510. Shpg. wt., 18 lbs.	45.08
Wilcox Gay 3A10. 2-Spd Tape Recorder.	
75F063. Shpg. wt., 26 lbs.	119.97
Pentron 979C. 2-Track, 2-Spd Recorder.	
74F908. Shpg. wt., 27 lbs.	139.50
Elocor 230. Two-Speed Tape Recorder.	
74F940. Shpg. wt., 30 lbs.	127.46
Espace 512C. FM-AM Tuner Chassis.	
96F031. Shpg. wt., 16 lbs.	69.50
Brush Mike. Hi-Z. At Special Price.	
54G350. Shpg. wt., 1½ lbs.	5.95
Wireless Mike. With built-in midget transmitter. Plays thru any radio within 50 feet. No wiring required.	
27F576. Shpg. wt., 3 lbs.	6.50
Drake 905. Popular Soldering Gun.	
33F056. Shpg. wt., 4 lbs.	11.02
Weller S-500. Heavy Duty Solder Gun.	
33F128. Shpg. wt., 3¼ lbs.	9.75
P.E.T. 625L. "Zephyr" Electric Hand Saw.	
33F521. Shpg. wt., 11½ lbs.	37.24
P.E.T. 77DK. Deluxe Electric Drill Kit.	
33F503. Shpg. wt., 10 lbs.	19.20
Cesco G-25. "Electromatic" Drill Kit.	
33F530. Shpg. wt., 3½ lbs.	12.97

Order from Dept. R-12

FOB Chicago,

Include Insurance and Shipping Charges

For Complete Description  
on These and Thousands of  
Other Items

Send for  
NEWARK'S NEW  
CATALOG NO. 56



**NEWARK**  
ELECTRIC COMPANY

223 W. MADISON STREET  
CHICAGO 6, ILLINOIS

man 0100, then music. (Sanderson, Australia)

**Greece**—Radio Athens, 11.716, noted 1355 in Greek; identified 1415, played march number, and left the air. (Ferguson, N.C.) Heard on 9.607 with Greek songs when tuned 0255. (Pearce, England) Noted on this channel in French 1450. QSA3. (Buret, France)

**Guadeloupe**—Basse-Terre is now reported on 6.067A instead of 9.425A to 2000 closedown. (ISWC, London, others) Noted 1810 with bad distortion. (Bellington, N.Y.)

**Guatemala**—TGNB, 9.668, noted at good level 2030 in Spanish; news in that language 2100. (Morrison, R.I.) TGWA, 9.76, is good level 1900 but has QRM from LRY1, Buenos Aires, same channel. (Bush, Chile) Has English session now 1900-1930 on Mon., Wed., Fri. (Parsons, Pa.) Strong 0740-0800. (Jensen, N.J.)

**Haiti**—AVC, 9.485, Radio Commerce, Port-au-Prince, noted closing down on this channel at 1900 with National Anthem; heard opening around 0630. (Ferguson, N.C.) Has popular music around 1600. (Diaz, Ind.) In a letter to Parsons, Pa., listed schedule of 0630-0830 on 9.485 (although is reported heard much longer in this session) and 1600-2300 on 6.140; the transmitter is a 7.5 kw. rig with two 889-RA's in the final stage; antenna is of matched impedance delta type, 80 ft. high on 31 m. and 60 ft. high on 49 m.; with the exception of two Ampex tape recorders, all equipment has been supplied by RCA; QRA is Box 1143.

**Haiti**, measured 10.074, noted in French 1700; on Thursdays has English musical request session 2130-2220. (Roberts, Conn.) The channel used by 4VEH on Sun. evenings (EST) was recently measured 9.717 at 2125. (Ballou, Calif.) This station plans a Spanish-English session soon on Mon. evening (EST), which will include a second broadcast of the DX program, "The Listener's Post," heard 0610 Sat. over 9.69. (West, Va.)

**Hungary**—Radio Budapest noted signing on for North America 1715 on 9.833, parallel 11.91, 7.22; stars with news; lists English for 1715, 1930, 2300 daily in this transmission. (Pearce, England) Heard opening 1430 on 9.833, 11.91 with relay of Moscow; has own French session 1500, English for Great Britain 1600. (Sawyer, Ont.)

**India**—AIR is noted on 6.145 at 0745-0830. (Stark, Texas) Bombay's 4.84 outlet is good level in Britain around 1200. (Patrick)

**Indo-China (Vietnam)**—Radio France-Asie, 11.935, Saigon, noted 1045 with light music; at 1100 woman said "Goodbye to our English-speaking listeners," then had news in French; closed 1120 with "La Marseillaise" after giving program details for next day in French. (Pearce, England) Noted on 15.420 at 0430 answering listeners' letters in English (Fri.), then with music. (Sanderson, Australia) English is listed 1830-1900, 7.23; 2030-2045, 11.935; 0900-1100, 11.935; news at 1830, 2030, 0900. (Gade-Joergenson,

Denmark) Seems to be using 6.116A now instead of 9.75A around 0600. (Balbi, Calif.) Sanderson, Australia, lists latter as a military transmitter, heard with French news and music, scheduled 0515-0615.

"Voice of Vietnam," 9.625, 7.29, heard with news 0930, best on 9.625. (Balbi, Calif.; Foster, Ore.) Radio Hirondelle, 7.405, Hanoi, lists schedule of 2300-0100, 0530-1000. (Williams, Australia)

**Israel**—Tel Aviv, 9.010A, parallel 6.830, now has news 1515-1530; the "Voice of Zion" session in English is now 1615-1700 closedown over 9.010A only; English news is announced for 0615 over both 9.010A and 6.830. (Pearce, England; Crowell, Pa., others)

**Jamaica**—Radio Jamaica noted back on 3.360 going past 2200. (Stark, Texas)

**Kenya Colony**—Nairobi, 4.855, noted closing 1500 with "God Save the Queen" after call; relays BBC news from London 1300. (Pearce, England)

**Kuwait**—Al Kuwait, 5.000, is often audible in Britain around 1330 through QRM from MSF, Rugby, same channel. (Patrick) Is scheduled 0000-0200, 1130-1400. (Radio Sweden)

**Lebanon**—Beirut, 8.036, is heard in Japan around 1400-1500 when begins to fade out. (Japanese Short Wave Club)

**Libya**—Forces Broadcasting Station, 4.965, Tripoli, noted 1446 with piano music, call 1500. (Pearce, England)

**Luxembourg**—Radio Luxembourg has dropped its 15.350 outlet and is now heard with strong level on 6.090; schedule is the same as Luxembourg I, 236 kc.; reports may be sent direct to the station or to 38, Hertford St., London, W1, England. (Patrick, England)

**Mauritius**—Malmo DX-aren, Sweden, reports V3USE, 15.070, Forest Side, is heard 1100.

**Mexico**—XEWX, 9.500, Mexico City, is good level with music around 1000. (Zerosh, Pa., others) The XEWA call given by this outlet refers to a 100 w. m.w. station in Mexico City. (Stark, Texas) XETW, 6.045, 0.1 kw., operates 0530-0830 English, 0830-1900 Spanish, 1930-0100 English; English sessions are for southern part of USA; location is Tampico. (WRH) XEBR, 11.82, Hermosillo, good signal around 1415. (Morgan, Calif.) XEHH, 11.88, is nice level around 1230. (Diaz, Ind.)

**New Caledonia**—Radio Noumea, 3.350, noted 0400 with music and news in French. (Sanderson, Australia)

**New Zealand**—Radio New Zealand, Wellington, is usually good on both 11.78 and 11.81 around 2245; has sports broadcast on Fri. around that time. (Ferguson, N.C.) Good over 11.78 at 0105 tune-in. (Bishop, Riggles, Ohio)

**Nigeria**—Lagos, 4.805A, noted 1300 with BBC news relay, then local news. (Pearce, England)

**Pakistan**—APK, 15.335, Karachi, noted with closing announcements at 2059, carrier off 2100. (Ferguson, N.C.) And on 11.885 at that time.

RADIO & TELEVISION NEWS

...put this  
**PROOF**

right into your  
customer's  
hand!

**NAME** MRS. L. EATON  
**ADDRESS** 109 B. STREET ANYTOWN  
**PHONE** ANY. 4455  
**MAKE** TV  
**DATE REC'D** 10/15/53  
**MOOD** 222A  
**FROM** 10/26/53

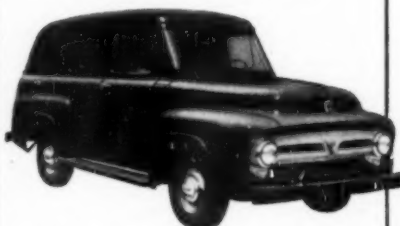
QTY	PARTS	MATERIAL
1	6SW7GT	
1	12AL7	
1	6W7GT	
1	.002 MFD	

**LABOR** \$7.05  
**SALES TAX** 7.00  
**TOTAL** \$14.05

**TV and Radio Service Co.**  
Main Street  
Anytown, U. S. A.

**CLAIM CHECK:**  
Must be presented at time of delivery  
being serviced by technically  
trained personnel using the latest equipment and  
parts for Quality radio and TV service.

### BE SURE TO ENTER THE CQS CONTEST



If you are using the CBS-Hytron *Certified Quality Service Kit*, you are eligible to enter. You simply tell in 25 words or less why you like the CQS Plan. As an eligible entrant, you get a famous CBS-Hytron Soldering Aid free. And you have a chance to win one of these 10 BIG prizes:

#### FIRST PRIZE: FORD PANEL TRUCK

- Second Prize: \$1000 in Savings Bonds
- Third Prize: 600 in Savings Bonds
- Fourth Prize: 500 in Savings Bonds
- Fifth Prize: 400 in Savings Bonds
- Sixth Prize: 300 in Savings Bonds
- Seventh Prize: 200 in Savings Bonds
- Eighth Prize: 100 in Savings Bonds
- Ninth Prize: 50 in Savings Bonds
- Tenth Prize: 25 in Savings Bonds

Remember, your CBS-Hytron distributor's salesman can help you win a prize. Be sure to write his name, too, on your Contest entry. Entry blanks are available in your CQS Kit . . . or from your CBS-Hytron distributor. Beat the closing date, Dec. 15, 1953.

### PROVE to your customer he can put his confidence in you.

Lay all the facts before him. Hand him this *Certified Quality Service Tag*. The Tag he has been reading about in LIFE-POST ads sponsored for you by CBS-Hytron. The same ads (and there'll be more) that are prompting him to ask where he can find you, his *Certified Quality Service* dealer.

With this simple, easy-to-use Tag, do what your customer wants. *Certify* that your itemized charges are fair. *Certify* that your service . . . your ability . . . and your equipment guarantee him dependable, top-quality TV and radio repairs. Give your customer *longable proof* that you are giving him his money's worth. Win his confidence. And you will gain more business . . . more profits. Put your convincing *Certified Quality Service Tags* to work right away.

### GO A STEP FURTHER

Tie in with the whole *Certified Quality Service Plan* as advertised in LIFE and the POST.



Use your  
decal.



Use your window streamer.



Use your LIFE-POST display.

They are all part of the *Certified Quality Service Kit*. This Kit, including 250 CQS Tags imprinted with your name and address, is available on a special offer from your CBS-Hytron distributor. Or you can write for details on how to order direct. You can order more CQS Tags from your distributor, whenever you need them.

### GO STILL FURTHER

Keep in close touch with your CBS-Hytron distributor. Watch soon for additional supporting material to identify you as a *Certified Quality Service* dealer:

1. CQS illuminated window sign
2. CQS metal range sign
3. CQS direct-mail postal cards
4. CQS newspaper mats, etc.



Manufacturers of  
Receiving Tubes Since 1921

**CBS-HYTRON**, Main Office: Danvers, Mass.

A Division of Columbia Broadcasting System, Inc.

A member of the CBS family . . . CBS Radio • CBS Television  
Columbia Records, Inc. • CBS Laboratories • CBS-Columbia, Inc. • and CBS-Hytron

# FACTS YOU SHOULD KNOW ABOUT UHF CONVERTERS

Many converters on the market today are unsatisfactory in fringe and shadow areas where signal strength is low. Before you install a UHF converter in these areas you should know these facts:

- 1** Signal power loss in the preselector seriously affects picture quality. Most UHF converters use sliding-contact shorted line tuners in the preselector with a fixed power loss of 6 db. The Turner converter uses High Q coaxial cavity tuners with no sliding contacts. Signal power loss is cut to 3 db. The resulting low noise figure keeps picture quality high.
- 2** Oscillator radiation often causes disturbing interference with neighboring sets. In the Turner converter the oscillator tube socket and all associated circuits are inside the coaxial cavity, self-shielded. Removable covers provide a second shield against radiation.
- 3** High amplifier noise figure can further damage picture quality. The Turner converter uses a special broadband amplifier with Cascode circuit. It retains the preselector signal savings without appreciably increasing the noise figure. The Turner amplifier noise figure is only 4 db.

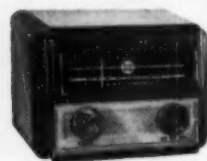
Whether you're selling converters for installations in shadow or fringe areas or putting one in your own home, remember . . . the Turner converter often means the difference between good reception and bad.

## EXCLUSIVE TURNER FEATURES

- Higher sensitivity
- Extremely low noise figure
- Exceptional frequency stability
- Double shielding
- Hi-Q silver plated coaxial cavities
- No sliding contacts

## OTHER MAJOR TURNER FEATURES

Continuous single-knob tuning. Illuminated slide-rule dial. Smaller size: 8"x6"x6". Use with UHF or combination antennas. Self powered, uses channels 5 or 6. Complete installation instructions for 110-120 volts 50-60 cycles AC. Schematic included.



List  
price  
\$49.50

In VHF fringe and shadow areas, the Turner Booster is a superior performer, too.

## THE TURNER COMPANY

900 17th St., N.E., Cedar Rapids, Iowa  
Export: Ad Auriemo, Inc.,  
89 Broad St., New York 4, N. Y.  
Canada: Canadian Marconi Co.,  
Toronto, Ont. & Branches

(Sawyer, Ont.) *Radio Pakistan* noted on 9.484 with news 1015-1030; heard 1230 with native music on 7.010, 6.235; and calling the United Kingdom on 11.65, 9.645 at 1530-1615. (Pearce, England; Buret, France)

**Panama**—The Panama station recently noted on 9.682 is HP5A, listed 11.70 and 11.697; relays HOC, 1440 kc. (Bellington, N.Y.) Identifies 1710A.

**Paraguay**—ZPA1, 6.275, is heard around 2000 with identification in Spanish. (DX-Radio, Sweden)

**Peru**—OAX4R, 15.146, Lima, noted 1530 in Spanish; still going strong 1600. (Ferguson, N.C.) At times announces in French, English, and Spanish; heard with English news 1345. (Niblack, Ind.) OAX4T, 9.562, Radio Nacional del Peru, Lima, announces 9.56 and gives schedule as 0700-2400. (Kahan, Calif.) OAX5Z is now listed 5.892. (Roberts, Conn.)

**Philippines**—DYH4, 6.055, Dumaguete City, sent schedule of 0500-0830. (Pearce, England) This one noted 0500 with world and local news; DZH3, 9.500, noted 0430 with church services, news, and music; DZH4, 6.000, heard 0500 with news and music; DYH2, 6.140, heard 0700 with English talk and music; DUH2, 6.170, noted 0545 with English talk, music. (Sanderson, Australia)

**Portugal**—Lisbon's Emissora Nacional noted signing on 1230 on 11.99, 11.83, off 1530; heard signing on 1600 on 11.962, 11.920; tuned in 1030 near 15.035; heard on 6.36 at 1715 with guitar music, with call 1735. (Pearce, England) Noted to North America 1900-2100 over 9.746, 6.374, 5.976. (Arnold, Bermuda)

**Bjorksten, Sweden**, says Lisbon transmits daily on 6.360, 7.260, 9.670, 9.740, 11.836, 11.970, 15.040, 15.125, 25.690 now, and that reports are verified with a fine new QSL card. *Etersvep*, Sweden, reports Parede, 12.865, heard in Sweden with music around 2105.

**Reunion**—Radio St. Denis is now scheduled weekdays 2130-0045, 0300-0430, 0900-1300; Sat. 2300-2400, 0130-0530, 0900-1300; frequencies are 3.380, 1 kw., during local night; 4.820, 1.5 kw., during local day time, and 7.170, 0.2 kw. (WRH)

**Roumania**—Radio Bucharest noted in German 1700 on 9.254, 6.210. (Pearce, England) Heard on 9.57 at poor level with English 2220-2230, and after piano interval went into foreign language session. (Scheiner, N.J.) And with English 1430. (Bellington, N.Y.)

**Saudi-Arabia**—Djeddah, 11.950, noted in Arabic from around 2230. (Sanderson, Australia)

**South Africa**—Cape Town's 5.892 is still heard occasionally around 0030. (Gay, Calif.)

**South Korea**—Direct from Hahn Wi Syun, chief of engineering section, Radio Bureau, Office of Public Information, Seoul (not Pusan now), Scheiner, N.J., learns that the s.w. outlets now are HLKA, Seoul, 2.510, 10 kw., and 3.8925, 1 kw., and HLKB, 7.935, 1 kw., Pusan; the 2.510 outlet is the

new 10 kw. transmitter; all programs are in Korean except for "Voice of Free Korea" (presumably in English) at 0415 Mon., Wed., Thur., Fri. The end of each broadcast is concluded with "HLKA, Seoul, Korea"; future plans are to build high-powered short and medium-wave stations. Pusan lately seems on 7.91 instead of 7.935, heard at fair level after 0400. (Balbi, Calif.)

**Spain**—Radio Nacional de Espana, Madrid, now operates on 15.460 at 1100-1155, and on 9.363 at 1200-2245. (Radio Sweden) Is good level in English to North America 2205A-2245A on 9.363. (Steiner, Mo., others)

**Surinam**—PZH5, 5.752, Paramaribo, noted in Dutch with Latin American music 2045. (NNRC)

**Switzerland**—The programs broadcast by the United Nations Information Center, Geneva, are Mon.-Fri. over HED5, 9.545 now, at 1315-1330 United Nations feature (Mon., Wed., Fri. in English, Tue., Thur. in French); 1330 news in English followed at 1345 with news in French. (WRH) Berne noted on 17.784 around 0945 with interference from BBC, London. (Bishop, Ohio) Heard on 6.165, 9.535, 9.665, 11.865 with English for North America from 2030. (Manning, Mich.)

**Syria**—Bush, Chile, reports Damascus heard on 11.915 at 2000-2005 at good level, but soon mixes with HCJB, same channel. Powers, Ohio, others, have received this new schedule for English broadcasts from Damascus—7.145 at 0500-0630 to Mediterranean; 11.695 at 0945-1045 to India-Pakistan, and 11.915 at 1630-1745 to Europe.

**Taiwan**—Taipei, 7.135A, noted 0445-0600 at fair to good level in native. (Saylor, Va.) Is good on 15.235 to North America from 2300, weak on 11.735 in parallel; quality has improved lately; HED24, 9.820A, noted 0530 with fairly clear signal, Western music; BED26, 10.080A, heard 1630 at good level with American music, then news in Chinese; BED32, 9.778A, heard 0400 with Western music, then news in Chinese. (Sanderson, Australia)

**Thailand**—HSK9, 11.680A, Bangkok, noted opening 0500 with news; heard on 6.24 recently 0830 with English lesson. (Balbi, Calif.) The 11.680A channel has been heard closing at varying times lately around 0715-0730. (Ferguson, N. C.; Bishop, Ohio, others)

**Trieste**—British Forces Station, 15.125, noted 1345 with request recordings; BBC news relay 1500. (Pearce, England)

**Trinidad**—Radio Trinidad, 6.085, is good around 0500-0700 with commercial programs. (Saylor, Va.) TAT, 9.515, is good level in Chile at 1800. (Bush) This one signs on in Spanish for Latin America 1730, starts with news in Spanish. (Pearce, England) Is fine level to North America daily 1815-1900. (Slaters, Pa., others) TAP, 9.465, noted 1600 with news. (Mast, N. Y.)

**Uruguay**—CXA19, 11.835, Montevideo, good level around 1830 with



# the C·D·R Rotor

**sells faster...sells easier**

*because.....*

## **The best line of TV Rotors money can buy**

It is the complete line of quality rotors, with a model and type to best serve 'most every type application.

## **TV Spot Campaign**

To reach the buying public, an intensive campaign on Television in key markets pre-selling CDR ROTORS for you.

## **Newspaper Advertisements**

Also directed at the consumer, a supporting campaign in key city newspapers exploiting the advantages of the CDR ROTOR.

## **Moving Displays**

It's causing excitement everywhere, this display that is an eye and traffic stopper, a silent salesman for the CDR ROTOR.

## **Envelope Stuffers**

Here's another selling tool that may be mailed directly to your customers, selling them the CDR ROTOR in their home.

## **Newspaper Mats**

A full set of completely prepared advertisements for dealers and distributors to capture extra CDR ROTOR business.

## **Window Streamers**

They let everybody going into and by your store know that you have the CDR ROTORS, a colorful and eye-catching streamer.



TR-12



TR-11



TR-2



**THE RADIART CORPORATION**  
CLEVELAND 13, OHIO



**CORNELL-DUBILIER ELEC. CORP.**  
SOUTH PLAINFIELD, NEW JERSEY

## "Buy a Xmas Gift for Yourself"



## COMMUNICATIONS RECEIVERS

Contains  
All Components

### FEATURES:

- 2 Watt P.P. Audio
- Amplified AVC
- Voltage Regulated Oscillator Supply
- Noise Limiter
- Beat Oscillator
- Air Tuned R.F. Trimmers
- 2 Stage Permeability Tuned
- 455 KC I.F. Plus Crystal Filter
- Phone Jack — Built-in Schematics by Relay
- Operation 105 to 125 Volts
- AC or DC Power Source
- Frequency Range 200 KC to 400 KC and 450 KC to 10 MC in Six Bands
- 40:1 Gearing Ratio Dial Drive
- 11 Tubes Plus Selenium Rectifier
- 6SG7 RF Amp.
- 6SB7 Mixer
- 2-6SG7 I.F.
- 6ME 2nd Det & N.L.
- 6SF7 AVC Amp.
- 6SL7 SFO &
- 1st Audio
- 6SL7 Phase Inverter
- P.P. 2SL6GT Audio
- VR-75 Voltage Regulator
- Full Vision Calibrated Dial
- Cabinet 10 1/2" long x 10 1/2" high x 12 1/2" deep
- Finished in fine grain, black & wrinkle
- Front panel silk screened to identify each control

### FRONT PANEL CONTROLS

- Tuning
- R.F. Gain
- Audio Gain
- SFO-AVC Switch
- SFO Pitch
- Power On-Off
- Stand-by
- Noise Limiter On-Off and Control
- Antenna Trimmer
- Crystal Filter On-Off
- Crystal Phasing
- Selectivity
- Band Change Switch
- Calibrated Dial Face

### ORDER TODAY!

TERMS: 25% Deposit with order. Balance C.O.D. Ship. weight 45 lbs. Shipped express only. F.O.B. Chicago and subject to change without notice.

**COMPLETE KIT**—This kit is complete with every part necessary to assemble into a finished receiver, including tubes and cabinet. Chassis is punched and marked. Mount the parts, wire it, align it and you have a fine receiver of commercial appearance, that can't be beat for 3 or 4 times the price. Parts layout, schematic diagram and alignment instructions are supplied.

**SPECIAL \$59.50**  
Complete Kit **KIT PRICE EACH**

**BOULEVARD ELECTRONICS, INC.**

DE 2-4458

808 10 W JACKSON BOULEVARD • CHICAGO 7, ILLINOIS

RADIO AND  
TELEVISION SUPPLIES

**A  
CREDIT  
TO YOUR  
HIGH  
FIDELITY  
SYSTEM**

**Collaro**  
for 7, 10, and 12  
INCH RECORDS *Fully Automatic*  
**3-SPEED RECORD CHANGERS**

**Model 3/532**  
Intermixes 10 and  
12 inch records.  
List Price — \$65.00

**Model 3/531**  
Non-intermix.  
List Price — \$54.50

**Model 3/534**  
Single record player.  
List Price — \$33.60

**WOOD BASE**  
Mahogany Finish.  
Specify Changer or  
Player.  
List Price — \$9.50



Available at  
Radio Parts Jobbers,  
Distributors, and  
Hi-Fi Dealers

Write for complete details to:

**ROCKBAR CORPORATION • 215 East 37th Street, New York 16, N. Y.**

music and Spanish commentary. (Diaz, Ind.) Station officials list this one as on the air daily 0600-2200. (Gay, Calif.) CXA10, 11.897, measured, noted with music 1823-1900. (Roberts, Conn.)

**USI (Indonesia)**—Djakarta verified after many months with a very "eye-catching" card. (Gay, Calif.) An Indonesian station is noted around 0600 on 4.985, probably is Coeta Radja, Sumatra. (Williams, Australia) Also heard in Sweden. (Radio Sweden) Djakarta, 9.710, noted in English 1000. (Foster, Ore.) YDQ2, 9.55A, Makassar, Celebes, heard signing on 0400, weak to fair. (Balbi, Calif.)

**USSR**—A station believed Moscow has been noted with a clock striking midnight at 1600 on measured 9.595. (Ferguson, N. C.) Same noted also on 11.79; evidently is beamed to Europe in German at 1530. (Balbi, Calif.) Has English on this channel 1700-1800.

**Vatican**—HVJ, 7.28, noted 1445 in German; 1500 in Portuguese. (Pearce, England) Heard at weak level some days on 11.74 in English 1315-1330; French 1345. (Crowell, Pa.)

**Yugoslavia**—Radio Yugoslavia, 6.100, Belgrade, heard 2245 to around 0030 fadeout, fair level. (Sawyer, Ont.) The English session 1645-1700 is over 6.100 and 7.200. (Hakansson, Sweden)

### Press Time Flashes

An unidentified station on 15.095A noted around 1330 to 1400 fade-out seems to be a Near Eastern outlet from the type of program heard; has interval signal of 13 harsh-sounding notes on a stringed instrument; appears to have news in Arabic 1330. (Niblack, Ind., others)

**Radio Liberation**, Munich, Germany, noted on 6.175 parallel 7.130 at 0845 in Russian dialects; 0900 in Russian, then talks by man and woman with frequent calls; similar program heard 0155 and 0300. (Pearce, England) This one has been heard on 11.77A at 1545-1600. (Niblack, Ind.)

In response to requests from listeners in Australia-New Zealand, **Accion Cultural Popular**, HJKH, 5.070, Suta-tenza, Colombia, now has an English session for New Zealand-Australia at 1030-1100 on Sat. only; other days comes on the air 0600. Opens with chimes, has devotional service, and then broadcasts for schools (pupils and teachers). (Sanderson, Australia)

**Radio Pakistan** now has its General Overseas Service (English news at dictation speed) 1310-1330 over 7.010, 9.614. (Radio Sweden) (Last-named channel may be 9.645 instead of 9.614. —K.R.B.)

Salisbury, Southern Rhodesia, noted near 3.400 at 1257 with weather forecast; 1300 BBC news relay; 1315 local and South African news. (Pearce, England)

### Acknowledgment

Many thanks for the fine reports received! Keep them coming to Kenneth R. Boord, 948 Stewartstown Road, Morgantown, West Virginia, USA. . . . . K.R.B.

**RADIO & TELEVISION NEWS**

**Concord Radio** presents the world's  
most powerful UHF-VHF-FM antenna!



**MONEY BACK GUARANTEED**

**TO RECEIVE *All* UHF and  
*All* VHF STATIONS IN *All*  
DIRECTIONS FOR 60 MILES  
WITHOUT A ROTORMOTOR OF ANY KIND!!**

While antenna reception is guaranteed  
for 60 miles, perfect pictures have been con-  
sistently received as far as 160 miles from  
stations.

***All* NEW DESIGN FOR '54**

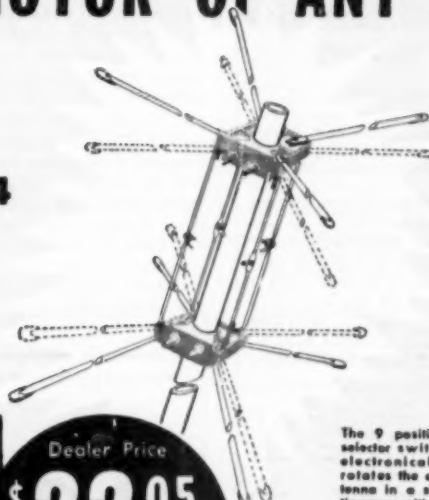
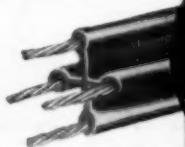
- LOW-LOSS SWITCH
- LOW-LOSS PHENOLIC INSULATORS
- USES NEW 4-CONDUCTOR  
MATCHED IMPEDANCE LINE
- ONLY 10 INCH SPACING  
BETWEEN ANTENNA BAYS

**NEW! POLYMICALENE 4 CONDUCTOR  
Matched Impedance  
TRANSMISSION LINE**

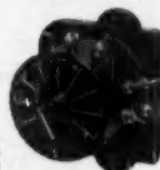
Improves Both UHF and VHF Perform-  
ance of any ALL-CHANNEL Antenna

100 Ft. .... \$8.90  
150 Ft. .... \$13.90  
200 Ft. .... \$17.50

Minimum quantity 100 ft.



**MODEL  
SUPER  
60**



The 9 position  
selector switch  
electronically  
rotates the an-  
tenna in a sta-  
tionary position.

Dealer Price  
**\$22.05**  
LIST PRICE  
**\$36.75**

**PRICE INCLUDES**

Complete stacked array • 4 stack-  
ing bars • 9 position switch •  
Switch-to-set coupler • 3 - 7 1/4"  
stand offs • Individually boxed in  
mailable carton

Mfg. solely by

**ALL CHANNEL ANTENNA CORP.**

New York N. Y.

under license Pat. No's 2,585,670.  
2,609,503. 2,625,655. 2,644,091.

others pending.

WRITE FOR FREE CATALOG

**Concord Radio**

53 Vesey Street, New York 7, N. Y. • Dlgby 9-1132

December, 1953

**CONCORD RADIO** 53 Vesey Street, New York 7, N. Y.

Please send me.....amount at \$36.75 list price.

Please send me.....amount at \$22.05 dealer net.

Dealers order on letterhead.

Please send me.....feet of 4 conductor tubular at

Name.....

Address.....

City.....State.....

☐ Check Enclosed ☐ Money Order Enclosed

☐ C.O.D. enclosed please find 25% of total purchase price.....check...

Money Order. Send Giant New FREE Concord Catalog at once

☐ Please put my name on your "Special Bargain" mailing list.

( ) Enclosed find \$.....in full. Send prepaid.

## FOR CHRISTMAS UNUSUAL GIFTS ARE BEST



**Pocket Model  
Jap. Import  
Multimeter**

In genuine leather  
carrying case

**\$11.95**

Only

(Plus 25c shipping)

RANGES: AC and DC volts 0-15/150/750, 4%, DC MA 0-150, 4%, Ohms 0-100K, 10%, 10 fused (nickel) battery case and leather carrying case.

(right)  
**MODEL 27-Z  
TESTER**

**\$9.95**  
Only

(Plus 25c shipping)



RANGES: AC and DC volts 0-25/250/500, DC MA 0-10/100/250, Ohms 0-10K, 100K, Black bakelite panel, metal case. Manufacturer claims extreme accuracy and our spot checks show them to be within 1%. Here is a meter to be proud of!

### GIVE HOBBYISTS UNUSUAL RELAYS

No. 1: Weston Sensitron is a SPDT Normally Open relay that operates directly from a photocell, thermocouple, etc. 10 us closes it. See Nov. ad. **\$12.95**

No. 2: Barber-Colman Micropositioner AY12 27408, metal plug-in, is SPDT both contacts. The polarity of applied voltage determines which contact makes. 0.4 Vdc (2 ma.) closes a contact, but when you switch positive for negative, the first contact opens and the second one closes. Think of all the tricks possible with this baby across a bridge circuit! **\$7.95**

No. 3: G.E. 5 ma. polarized relay is similar in action to above, in a different package. See Nov. ad. p. 207. **\$6.95**

No. 4: BK-7 adjustable-sensitivity SPDT, starts at 1/2 ma. See Nov. ad. p. 207. **\$1.95**

No. 5: Dual-Sensitive Sequence switching. First contacts close at 1 ma., second at 0.12 ma. See Nov. ad. p. 207. **95c**

No. 6: 6V or 12V Antenna Relay BK-16 DPDT. NO, 30A contacts, plus NC 5A contacts plus small NO contacts for added function. **\$1.75**

No. 7: 6V or 12V Starting Relay BK-17, SPDT, 30A intermittent, 20A continuous. **\$1.75**

No. 8: 115V, 60 cy DPST 30A contacts, NO. **\$1.49**

**COMBINATION GIFT PACKAGE:** All 8 above relays (total \$35.74 if bought separately) **\$27.50**

### GIVE A HI-FI HEADSET

Uses unusual grooved plastic three cones with voice coils as in speakers, and padded chinmike our muffs to obtain spacing for correct acoustical load. Gives finest music reproduction. Pair in series has measured impedance of 600 ohms at 1000 cycles, obtained with built-in high quality transformers. Checked out with freshly laundered ear pads and long flexible fabric cord with phone tips. **\$7.95**  
(Shipping weight, 3 pounds)

### MINIATURE 6 VOLT WET BATTERIES



The famous NT-6 Willard 3AH, 6 volt battery. A standard for model control, etc. Plastic case, only 3 1/2" long, 1 1/2" wide, 2 1/2" high. Uses standard electrolyte.

**NEW, boxed ..... \$2.49**

Or 4 for ..... **\$8.50**

Plastic 6 volt similar to above but 1 1/2" x 1 1/2" x 2 1/2" h. **\$2.95**

Charger for 6V batteries ..... **\$2.75**

2V Plastic 3 AH, 1/2 length of NT-6 ..... **\$0.79**

2V Plastic 12 AH, 1/2 length of above 12 AH. **\$1.45**

2V Plastic 20 AH, 3/4" x 2 1/4" x 5 1/4" h. Willard Bih-54, New, with built-in hydrometer. **\$1.75**

Charger for 2V batteries ..... **\$1.75**

### 12-CHANNEL TV FRONT END

Famous "Silver Circle" tuner, with original factory instructions. Use for 2-meter converters, receivers, etc. The TV bargain of the year! Factory rejected for minor damage. Less tubes. **\$1.99 each, 3 for \$5.00** (Shipping wt. each 3 lbs.) Tubes, shields and knobs for above. **\$1.25 set, 3 for \$3.00**

### CRYSTAL MICROPHONE GIVEAWAY!

Sensitive boron acid capsule sealed in compact, flat container with tuned terminals. Crisp, clear, high-level output. Ideal for lapels, line, hook-ups. Individually tested, guaranteed. **ONLY 98c**

### NEW CR TUBE GIVEAWAYS

5HP4 ..... **\$3.25 5HP1 ..... \$3.95**  
(Shipped express collect)

### G. L. ELECTRONICS

905 S. Vermont Ave., Los Angeles 6, Calif.  
All Prices F.O.B. Los Angeles Calif. Buyers Add Sales Tax  
GET ON OUR MAILING LIST

# FOOLPROOF 2-BAND TRANSMITTER

By WILLIAM BRUCE CAMERON, WBIVJ

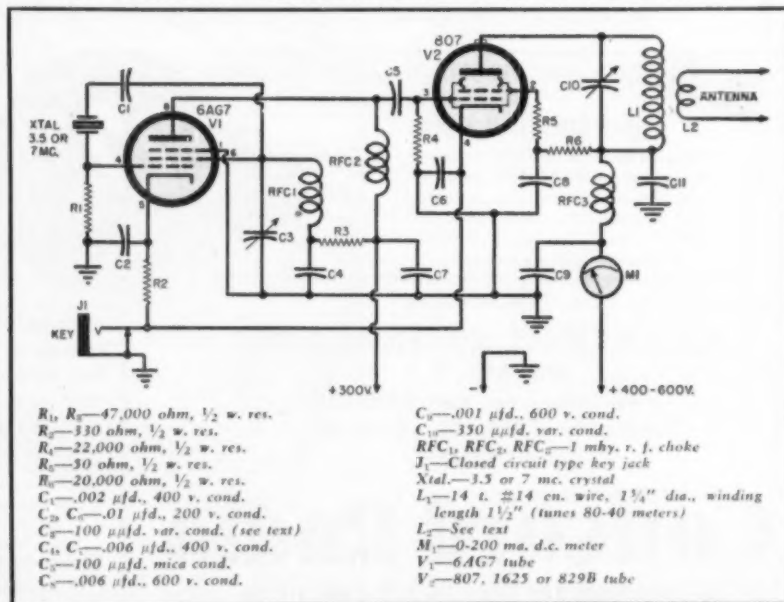
*Circuit data on a simple 80-40 meter Novice or standby two-tube, crystal-controlled transmitter.*

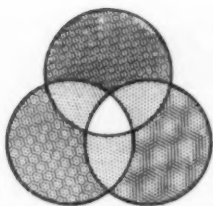
THE schematic diagram accompanying this article shows a two-tube, crystal-controlled transmitter, capable of sixty watts input on two adjacent bands, with only one tuned circuit and no coils to change, making it an ideal 80-40 meter Novice or standby rig. Since there is no tuned circuit between the plate of the modified Pierce oscillator and the grid of the final amplifier, there is no tendency toward self-excited oscillation in the final, which is a neat trick with an 807 or 1625. The same circuit has been employed also with an 829B with similar success and greater output. Keying both cathodes avoids the necessity of fixed bias on the final. Excellent isolation in the 6AG7 permits plate and screen modulation of the final for phone operation without requiring a buffer stage, if power supplies are stable and well isolated. No specific layout is shown, because placement of parts does not appear to be in the least critical, several different physical layouts having given equally good results. It may be advisable in some cases to shield the 807, although this has not been found necessary.

The coil indicated tunes 80 and 40 meters, with ample capacity in the condenser on both bands. Other bands could be covered with different coils, but it must be remembered that the rig is designed to operate "straight through" on the crystal frequency. This concession is made in order to avoid the instability which sometimes results when tuning the plate circuit of the 6AG7. The feedback condenser from the screen of the oscillator to ground need not be variable and could be replaced by a fixed capacity of 25 to 50  $\mu\text{fd.}$ , but the variable feature helps utilize balky crystals which otherwise might not key well.

Coupling arrangements to antennas will vary with the type of antenna and feed-line employed. A folded dipole made of 300-ohm ribbon fed with the same kind of ribbon could be coupled with a few turns of wire around a form which could be slipped in and out of the tank coil. In one such rig, the tank coil was wound on phenolic tubing, mounted horizontally, and the coupling coil wound on a short piece of dry one-inch dowel rod, providing easy variation of coupling.

Schematic diagram of the two-tube transmitter which will cover 80-40 meter bands.





# "Color Television"

A special issue containing

## ▲ 15 N.T.S.C. Monographs

The National Television Systems Committee has authorized IRE to publish its long awaited Monographs in the January 1954 special Color Television issue of "Proceedings of the I·R·E" — thus giving them industry-wide distribution for the first time in print.

## ▲ 25 additional Color TV articles —

will also appear in this issue, which brings the reader up-to-the-minute on the developments of Color Television. Copies of the first Color Television issue are still available and combined with this second Color Television issue will form a complete bibliography of major historical importance. Also included in the January issue will be a complete listing of the N.T.S.C. system specifications as submitted to the F.C.C.; and field test reports on the system's performance.

## ▲ in "Proceedings of the I·R·E" January '54

Available to non-members for \$3.00. Extra copies to I R E members are \$1.25. All members get one copy free!

*Another  
History  
Making  
Issue!*



*I R E is an organization of 33,312 member-engineers. There are no company memberships. Operating continuously since 1913, its sections meet in 78 cities, 21 specialized Professional Groups widen the scope of its member-services and 40 technical committees help the industry.*

## "Proceedings of the I·R·E"

*Published by*

**THE INSTITUTE OF RADIO ENGINEERS**

1 East 79th Street, New York 21, N. Y.

Please place orders before December 10th.

# Only **ROHN** TOWERS

**ARE PROVED IN CONSTRUCTION,  
DESIGN, USE & SALES**

**3** standard self-supporting **ROHN** steel towers  
for your every need!

## Famous ROHN FOLD-OVER TOWER (Pat. Pending)

Fold-Over Tower uses standard tower sections plus an inexpensive easy-to-use "fold-over" kit. The perfect answer to this type tower requirement.

**NO. 5**—A 9-in. triangular designed tower especially designed for TV needs. Can be used up to 40-ft. non-guyed or guyed to 80-ft. An economical, yet sturdy, permanent tower. Can be climbed as can all ROHN Towers.

**NO. 10**—The standard 12-in. design—heavy duty tubular steel, electric welded and heavily cross-braced through out. Used by thousands coast-to-coast. Up to 50-ft. non-guyed—guyed to 120-ft.

**NO. 20**—Uses a 14-in. triangular design—the heavy duty tower. Ideal for communications and where greater heights is required.

All ROHN towers in 10-ft. sections for easy erection and transportation.

## ROHN TELESCOPING MASTS

Come in 20, 30, 40 and 50 ft. sizes. Easily erected, heavy-duty seamless steel tubing throughout.

### PLUS A COMPLETE LINE OF ACCESSORIES:



Contact your **ROHN** distributor for  
FREE catalog and Prices or write:

**ROHN**  
MANUFACTURING  
COMPANY

DEPT. RTM  
116 LIMESTONE  
BELLEVUE,  
PEORIA,  
ILLINOIS

## R.F. Amplifier (Continued from page 69)

if desired. This should be adjusted to around 15 ma. when the 829B is fully loaded.

It will be noticed that a shield is fabricated on one of the side covers. This arrangement provides shielding between the tube and tuning condensers and also shields the input condenser from the output condenser. It is not needed in this particular installation but that was not known until after everything was finished and tested. Its use is recommended, however, as there may be some stray coupling present, although not to the extent of causing oscillations. Plenty of ventilating holes are needed in the sides of the box. The 829B runs hot at any frequency and 220 mc. doesn't do a thing for it in the way of cooling. As mentioned earlier, if a small fan or blower is used, the input can be packed up to at least 120 watts, perhaps a little more, if one is quite careful.

Without a doubt, it would be desirable to provide shield covers for the grid and plate lines to reduce loss from radiation and to improve the output efficiency, but so far we have not bothered to do it. Small shields of soft aluminum sheet could be bent up for this purpose. TVI was absent on the channels used locally (4, 5, and 8). What the u.h.f. TV channels have in store is not known. Trouble, no doubt.

Now about that AX9903 tube again. Can't seem to get off the subject. The "Handbook" states that its maximum frequency is 150 mc. but this is bound to be misleading. Evidently new revised ratings will show the tube good to 450 mc. since many of the boys report good results at this frequency, and did you ever hear of an 829B tube perking away down there?

It is not known just how much the AX9903 would do for this amplifier, but we sure would like to find out. So until this little gem of a tube comes to your house and mine, the old 829B will give you a pretty nice signal on 220 mc.

-30-



## NEW UHF HI-GAIN CONVERTER

**\$36.95**

Fits into well of any 630 chassis. Can also be used with any TV set. Continuous tuning. 3 Hi-Q circuit resonators. Cascade I.F. stage. No moving electrical contacts. Only 2 wires & antenna lead to connect. 3 tube operation. Complete with brackets, dial, etc.

Send 20% deposit with order

**AIREX RADIO CORP.**

SHOWROOM: 171 Washington St., N. Y. 7  
MAIL ORDER: 400 Lafayette St., N. Y. 3

## \$2.95 EACH OR 2 FOR \$5.00!



Genuine Telephone Company Upright telephone complete with cord in Tested and Guaranteed condition. For inter-communication or extension. Complete line of telephones and parts, inter-communication systems, switchboards, handsets, magneto and dial telephones, etc. Write for free list. C.O.D. orders accepted. All shipments F.O.B.

**TELEPHONE ENGINEERING CO.**  
Dept. BB Simpson, Pa.

## SPEAKER RECONING

Complete line Cones, Spiders, Rings and Voice Coils. Custom Built Voice Coils. Low prices. Write for Parts List and Reconing information.

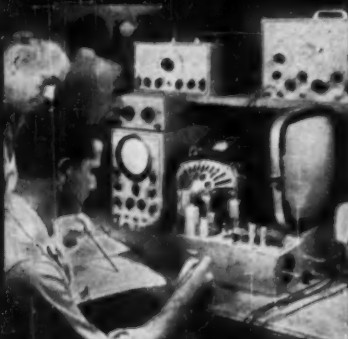
**WESTERN ELECTRONICS CO.**

3164 West Colfax Denver 4, Colo.





Train IN  
Great COYNE shops  
for big pay jobs



1" Television  
-Radio



OR  
Electricity  
-ELECTRONICS

Learn on REAL EQUIPMENT!  
In Best Equipped School of its  
kind in U. S.

Prepare for your future NOW! Come to the Great Shops of Coyne. Get practical training in opportunity fields—TELEVISION-RADIO—ELECTRICITY—ELECTRONICS. Prepare for a better job in industry or better service rating if drafted.

#### WE TRAIN YOU IN CHICAGO

At Coyne you learn on real, full-size equipment. Trained instructors show you how, then you do shop jobs yourself. No previous experience or advanced education needed.

#### Approved for Veterans

Finance Plan—Enroll now, pay most of tuition later. If you need part-time work to help out with living expenses while at Coyne, we'll help you get it. Special tuition plan for men of draft age.

FREE BOOK Clip coupon for Big Free Illustrated Book. No salesman will call. Act NOW.

**COYNE**  
SCHOOL

800 S. Paulina St., Dept. 93-85H  
Established 1899  
APPROVED FOR VETERANS

B. W. COOKE, Pres.  
COYNE School  
800 S. Paulina St., Chicago 12, Ill., Dept. 93-85H  
Send FREE BOOK and full details on:

☐ TELEVISION-RADIO ☐ ELECTRICITY  
NAME .....  
ADDRESS .....  
CITY ..... STATE .....

120

## What's New in Radio

(Continued from page 104)

tor range switch actuates a mask which exposes the operating frequency dial range.

### BEAM POWER AMPLIFIER

The Tube Department of Radio Corporation of America, Harrison, N. J. has released a new beam power amplifier of the 7-pin miniature type which has been designed primarily for use as the output amplifier of auto radio receivers operating from 12-volt storage batteries. It may also be used in the output stage of a.c. operated radio receivers.

According to the company, within its maximum ratings the 12AQ5 is the performance equivalent of the larger glass-type 12V6GT. A tentative data sheet on this tube is available from the company on request.

### TUBE TESTER

Smithguld, Inc., 360 W. Eighth St., Erie, Pa. is offering a new tube tester for checking the continuity of filaments in tubes used in all types of electronic devices.

The compact unit, 4" x 6", is completely self-contained and weighs only 7 ounces. It requires no external bat-



teries or other accessory equipment. The sockets provided on the face of the unit are designed to accommodate any electronic tube now manufactured for use in household appliances.

The meter indicates whether the tube is good or defective.

### "HERMETIC-OUNCERS"

The Electronic Division of Thermador Electrical Mfg. Co., 2000 Camfield Rd., Los Angeles 22, California now has available a small, light, hermetically-sealed transformer, the "HO-Hermetic Ouncer."

The new transformers are  $\frac{15}{16}$ " in diameter and  $1\frac{1}{4}$ " high. They weigh from 1 to  $1\frac{1}{4}$  ounces. They feature 40 db magnetic shielding, 200 degree F operating temperature, true hermetic sealing, and schematic decals with a gray satin finished case.

Complete information is available from the company.

### TANTALUM CONDENSERS

General Electric Company's Capacitor Department, Hudson Falls, N. Y.

has developed a tiny tantalum condenser which is believed to be the smallest high capacity unit ever designed for low voltage, direct current applications.

The new unit is  $\frac{5}{16}$ " long and  $\frac{1}{8}$ " in diameter and is designed to make possible further size reductions in miniaturized assemblies using transistors. It is intended as a companion to the transistor.

The condenser is available in ratings from 2 to 16 volts, 4 to .7 microfarads



respectively. It is designed to operate over a temperature range of -20 to +50 degrees C.

### CONNECTOR KIT

The Microdot Division of Felts Corporation, 1826 Fremont Ave., South Pasadena, California has introduced a new kit for micro-miniature connectors and cables. The kit is fully equipped for prototype construction with a self-assembly hand tool especially designed for make-up of typical coax assemblies using "Microdot" connectors, "Mini-noise" cable, "BNC" adapters, etc.

The kit is expected to bring economies in time and money for laboratories, research, and design engineers. The kit will enable specialists to work out several experimental coax assemblies before "designing in" and production.

Complete information is available from M. H. Lewis of the company.

### FREQUENCY CONVERTER

In response to the growing demand for a convenient 400-cycle supply, Georator Corporation of Manassas, Va. has developed and is marketing a compact motor-generator unit to convert 60 cycles to 400 cycles.

Because of its "Nobrush" construction, the unit is said to possess long life, durability, and freedom from excessive maintenance. It is compact and has reduced heating.

Outputs of 150 volt-amperes to 25 kva single or three phase are available with motor drive for any standard frequency or voltage. Circular E11 describes the product in detail and is available on request.

### "SPEED-CHASSIS"

Specific Products, 5864 Hollywood Boulevard, Hollywood 28, Cal. is in production on a new "Speed-Chassis" which provides a flexible breadboard assembly with interchangeable socket arrangement.

A novel feature of this chassis is that it can be mounted on a relay rack. A sturdy shield can is available to permit the breadboard assemblies to be made permanent.

A copy of Bulletin #853, listing all

RADIO & TELEVISION NEWS

Send for Your  
**FREE**  
Copy of the NEW 1954  
**MIDWEST**  
**TELEVISION and**  
**RADIO Catalog**

# MIDWEST *Presents*

For 1954 a Completely NEW LINE of  
**21" and 27" TELEVISION**

CONSOLES  
TABLE MODELS

and  
**COMPLETE  
CHASSIS**

at  
**LOW FACTORY  
PRICES**



YOUR CHOICE OF EITHER 12 CHANNEL  
VHF or All-Channel VHF-UHF Models

Buy your Television or Radio Direct from the Midwest Factory . . . on  
**30 DAYS TRIAL . . . Easy Terms . . . and at LOW FACTORY PRICES.**  
For 34 years Midwest, the world's largest and oldest exclusive Factory-  
To-You radio and television manufacturer, has served hundreds of thou-  
sands of satisfied customers all over the world.

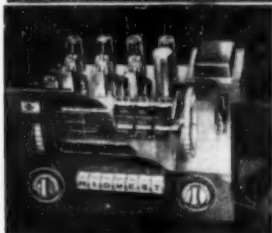


**EASY TERMS**  
— — —  
**30 DAYS  
TRIAL**

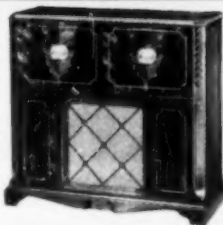


**RY-TO-YOU**

Also—Powerful New 1954 World-Ranging  
**MIDWEST Series 16 RADIOS**  
In Beautiful Consoles and Complete Chassis



Once again Midwest offers its famous series 16 five band AM-FM radio chassis and the magnificent new Symphony Grand Radio-Phonograph with 3-Speed Automatic Inter-mix Record Player. Also, a complete line of clock radios, table radios, and portables.



All models available in your choice of mahogany, walnut finish or blond lined oak.



• **WRITE IN NAME AND ADDRESS (PLEASE PRINT) ON COUPON OR 2c POSTCARD** •

**MIDWEST RADIO & TELEVISION CORP.**  
Dept. D-37, 909 BROADWAY • CINCINNATI 2, OHIO

Please send me your new FREE 1954 Catalog.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

**MIDWEST RADIO & TELEVISION CORP.**

## CRYSTALS

Low Freq.—FT 241 A for 550, lattice filter, 1/2" apc. 54th harm channels listed by fund. Fractions omitted.

370	388	407	425	444	462	481	501
372	390	409	427	446	464	483	503
374	392	411	429	448	466	485	505
375	394	412	431	450	468	487	507
377	396	414	433	451	470	488	509
379	398	416	435	453	472	490	511
381	400	418	437	455	474	492	512
383	401	420	438	457	475	494	514
385	403	422	440	459	477	496	516
387	405	424	442	461	479	498	

49c each

10 for

\$4.00

Radar indicator unit for conversion to test scope or for use as a modulation monitor. Complete with tubes. But, less 5BP1. Parts alone are worth much more. New... **\$9.95**

**DYNAMOTORS:** The best dynamotor for conversion to 6v. Multiple windings! After conversion you get choice of 190 or 350 v. at 50 MA or 250 v. at 100 MA. Complete dope sheet furnished. BRAND NEW (See "CQ" Aug. issue)... **\$4.65**

**RT/APN-1 TRANSCEIVER UNIT**—Used as an altimeter, it may be converted for signaling control circuits, etc. Used, less tubes, **\$4.95**  
as is .....  
3 for \$10.00

## MONTHLY SPECIAL SURPRISE PACKAGE

15 lbs. of assorted good radio parts. A real value at... **\$1.95**

**RT-34 APS 12 TRANSCEIVER** used as a tall warning radar on 415 MC. Containing a 30MC IF Strip and various other parts, these units have been stripped of RF sections and all tubes, but are an excellent buy if only for parts and IF Strip..... **\$4.95**

## WOBBULATOR

**BUILD TV-FM-AM SWEEP GENERATOR**  
You can build "Versatile Sweep Frequency Generator" with APN-1 magnetic units. **\$5.95**

## MIKES and HEADSETS

**HS-33 Low Impedance Headset**.....exc. \$2.95 new **\$5.45**  
**HS-23 Headset** used 2.50 new **4.50**  
**CD-307 Ext. cord for HS-23-33**.....like new **.79**  
**Throat Mike—T-30**.....new **.98**  
**Lip Mike—Navy Type**.....new **.98**  
**CW-49585 High Impedance headset** complete with headband.....Used **98c**  
**H/16U**.....Used \$2.49 new **\$4.95**  
**T-45 Lip Mike**.....New **1.75**  
**HS-30, miniature headset**.....Used \$1.49 new **2.49**  
**T-26 Mike—Chest type—brand new** with Western Electric F-1 unit..... **2.49**

	As Is	Less Tubes	Exc. Used	New
BC-451 Receiver, 3 to 6 mc....				\$11.95
BC-455 Receiver, 6 to 9 mc....				\$4.95 9.95
BC-456 Modulator.....	2.95	4.95		\$7.95
BC-457 Transmitter, 5 to 5.3 mc				4.95
BC-458 Transmitter, 5.3 to 7 mc				4.95
BC-459 Transmitter, 7 to 9 mc				7.95 14.95
Control Boxes, racks, receivers for above in stock—write.				
BC-1033 62-80 mc recvr. Like new, less tubes				each \$5.95
BC-700 Inter. Amp. New.....				3.95
BC-457 and BC-458—for parts only.....				2 for \$5.00

**R-1 ARR-1-220** mc converted with minor alterations becomes a high gain converter with two stages of R. F. amplification (see "Radio & TV News," Jan., 1949).....new **\$4.95**

**11 TUBE UHF TUNABLE RECEIV-ER** 234-528 mc, less tubes..... **\$7.95**

Write for New Catalog

## R W ELECTRONICS

Dept. N, 2430 S. Michigan Ave., Chicago 16, Ill.  
PHONE: Calumet 5-1281-1282-1283—New Phone

of the features of the product, is available from the company on request.

## PIN STRAIGHTENERS

A new tool, a twin pin straightener, has been developed by **CBS-Hytron** of Danvers, Mass., for radio and television service dealers as well as electronic technicians and engineers.

The new tool is compact, handy,



light, and roll-proof. It will straighten the pins of both 7- and 9-pin miniature tubes. The individual 7 and 9 pin straighteners are still available for bench mounting, etc.

## CHECKING DEVICE

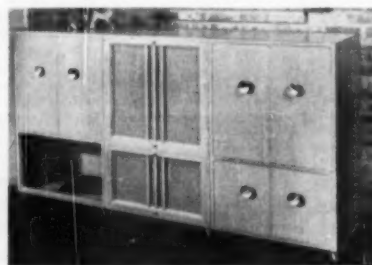
A new low-cost device to be used as a substitute for an expensive v.t.v.m. in checking frequency responses of high-fidelity music systems has been announced by **The Dubbings Company** of 41-10 45th Street, Long Island City, N. Y.

Utilizing the principle that the loudspeaker is driven by electric current that is measurable in volts, this device, called the **D-500 test level indicator**, consists of three low-current, low-voltage bulbs so calibrated as to light up at 3 db intervals when fastened across the loudspeaker leads of a sound system or the output terminals of an amplifier. When used with any frequency test record, the **D-500** will indicate whether a phonograph or record-playing system is reproducing the sound spectrum properly.

## CABINET LINE

**The Angle Genesee Corporation**, 107 Norris Drive, Rochester, N. Y. is in production on a wide variety of cabinet housings for high-fidelity music systems.

Among the items now being offered



is a line of co-related equipment consoles available in a wide choice of arrangements to house any combination of equipment. As the audiophile adds to his sound systems, cabinet arrangements may be changed by simply replacing panels.

These consoles come in mahogany and blonde finishes in traditional and modern styling. Write the company for full information on its complete line.

## "STYLUS-DISK"

**Audak Company**, 500 Fifth Ave., New York 36, N. Y. has developed a "Stylus-Disk" made of specially compounded, soft material which makes the home checking of any jewel point easy and simple.

To check the stylus, an ingenious method has been devised. Grooves are recorded eccentrically introducing considerable thrust, first on one and then on the other side of the stylus during each revolution of the disc. Thus any worn or defective stylus will scrape the delicate surface of the grooves, leaving a positive, visible indication.

The new disc is currently available at stores handling hi-fi gear.

## AUDIO COMPENSATOR

**The McIntosh Laboratory**, Binghamton, New York is now offering an accurate and easily-operated professional audio compensator, the **C-108**.

The unit is supplied with an instruction booklet showing curves and settings recommended by each recording company. Separate bass and treble compensation adjustments can be seen at a glance on the simple diagrams.

The **C-108** is equipped with an aural compensator and rumble filter. Its



flexibility permits the listener to enjoy high-fidelity records from any manufacturer without changes in basic playback equipment.

## PERMOFLUX SPEAKERS

**Permoflux Corporation**, 4900 W. Grand Ave., Chicago 39, Illinois is now offering its new line of "Super Royal" speakers for use in quality audio systems.

The "Super" series features a newly-designed magnet structure, utilizing a heavy Alnico 5-ring magnet and Armco iron; a newly designed voice coil for extended high-frequency response and added power handling capacity; a slotted, treated cone for low resonance and good low-frequency response; and a metal diaphragm at the cone apex for better dispersion of highs.

Included in the line are the "Super Royal 12," the "Super Royal 15," and the "Super Royal 8." The 12" speaker has a frequency response of 35 to 14,000 cps; the 15" unit covers 30 to 11,000 cps while the 8" speaker has a frequency response from 45 to 14,000 cps.

-50-

RADIO & TELEVISION NEWS

# REG. \$117.50 SUPREME TUBE TESTER—V.O.M. ON SALE AT McGEE FOR \$64.95

WITH ROLL CHART—7 INCH METER—BUILT IN BATTERY TESTER

SUPREME MODEL 600 \$64.95

Supreme Model 616 tube tester and battery tester. This is the same instrument as the model 600 except it has no volt-ohm and milliamp scale. However, it's a top quality tube tester, with illuminated roll chart and a complete dry battery tester. Made to sell for \$87.45 dealers' net. Our price of \$49.95 is good only as long as the limited supply lasts. Shipping weight 24 lbs. Sale price, \$49.95

MODEL 616  
REG. \$87.45  
**\$49.95**

Supreme Model 600 tube tester, dry battery tester, volt ohm meter. All in one gray metal portable carrying case, 10"x12"x7 1/4". Large 7" meter, easy to read. Calibrated good-bad scale for tube testing with easy to read volt-ohm and milliamp scale. Most people can operate this meter without glasses, the printing is so large, as you would expect with a 7" meter. Illuminated roll chart. Push button tube checker operation. Easy to learn how to operate. Battery tester will check all dry batteries under proper load. Has 6 resistance ranges from .1 to 20 megohms. 6 AC-DC volt ranges from 0 to 2500 volts. 6 milliamp ranges from 1 to 1000 and 0 to 10 amps. This meter has a regular net price of \$117.50. Our special purchase makes this \$64.95 price possible. Think of it, the battery and VOM part is worth one-half our sale price. Stock No. 600 Supreme tube-set tester on sale for only \$64.95 at McGee. Only a limited supply is available. Shipping weight 24 lbs.



SUPREME MODEL 600

## INDIVIDUALLY CARTONED ELECTRONIC RADIO & TV TUBES

McGee offers you a wide selection of good quality TV and Radio tube types. Individually cartoned. Our private brand. These are not set mfg's, culs, but a carefully inspected private line of tubes with a full 6 months' guarantee. Types listed are in stock in good quantity at this time. Thousands sold. Order 50 tubes and take 10% off the listed prices.

024	50.99	6B4T	40.99	6T8	79.99	12X6GT	50.99
1A7GT	79.99	6BC6	40.99	6U8	79.99	12Q7GT	50.99
183GT	79.99	6BD6	40.99	6V6GT	79.99	12S7GT	50.99
1H9GT	79.99	6BF5	40.99	6W4GT	79.99	12SJ7M	50.99
1L4	79.99	6BF8	40.99	6X4	79.99	12SJ7GT	50.99
1R5	79.99	6BG6	1.29	6X5GT	40.99	12SN7GT	50.99
1S5	79.99	6BH6	50.99	7A7	60.99	12S7GT	50.99
1T4	79.99	6BJ6	50.99	7B6	60.99	12S7GT	1.79
1U4	79.99	6BK7	50.99	7H7	79.99	12S7GT	50.99
1U5	79.99	6BQ6GT	50.99	7Y4	60.99	25B6GT	50.99
3Q4	79.99	6C4	39.99	12AL5	50.99	31L6GT	50.99
3Q9GT	60.99	6CB6	50.99	12A8GT	60.99	32L7GT	70.99
3S4	79.99	6CD6	1.49	12AT6	40.99	35B5	50.99
3V4	79.99	6CG6GT	50.99	12AT7	40.99	35C5	50.99
5U4G	40.99	6K7GT	50.99	12AU6	50.99	35W4	39.99
6AR4	60.99	6L6	1.09	12AU7	50.99	38L6GT	50.99
6AX5	79.99	6EA	40.99	12AV6	50.99	43	70.99
6AL5	40.99	6EA7GT	50.99	12AV7	60.99	50B5	50.99
6AQ5	40.99	6E9GT	50.99	12AX4GT	50.99	50C5	50.99
6AT5	40.99	6F5GT	50.99	12AX7	60.99	50L6GT	50.99
6AU5	40.99	6H7GT	50.99	12BA6	50.99	70L7GT	50.99
6AX4GT	40.99	6H7GT	60.99	12BD6	50.99	117Z3	30.99
6BA6	40.99	6B7GT	60.99	12BF6	70.99		

## 25-WATT MOBILE AMPLIFIER \$99.95



WITH 25 WATT  
TRUMPET \$127.95

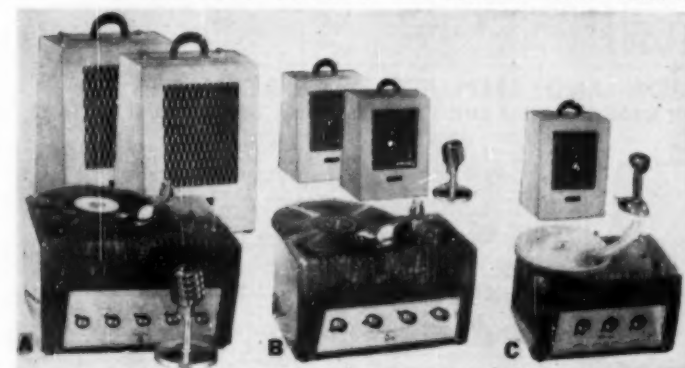


25 watt, mobile amplifier for 6 volt and 110 volt operation complete with 3 speed turntable and pickup for playing all 3 speeds and all 3 size records. Less than 5% distortion. Inputs for 2 microphones, tone control, off-on switch and standby switch. Includes tubes: 6SU7, 6SC7, 6J5, 2-6L6 and 2-6X5GT rectifiers. Frequency response from 40 to 15,000 cps. Output impedances 2, 2.7, 4, 8, 16, 250 and 500 ohms. Size, 13" x 14 1/2" x 9" high. Two-tone gray hammerloid finish. Model MG-25M, 6-110 volt amplifier. Sale price \$99.95.

Model MG-25M, 6-110 volt amplifier, complete with 1-25 watt trumpet and driver as pictured. Sale price only \$127.95.

Model MG-25M, 6-110 volt amplifier complete with 2-25 watt trumpet and driver combinations and Astatic JT-30 crystal mike and desk stand. Complete system. Stock No. MG-25MS. Sale price, \$165.90.

## AMERICA'S FINEST 28 WATT—50 WATT AND 10 WATT P.A. VALUES



50-WATT PORTABLE P.A. ON SALE \$99.95  
3-SPEED PHONO TOP—TWO 12" SPEAKERS

(Illustration A)

10-tube portable 50-watt public address system. 4-6L6 (push-pull parallel) output tubes. Inputs for 2 microphones, either crystal or dynamic, with separate mixing volume controls. Twin bass and treble tone controls. High fidelity wide range output transformer with taps at 4, 8, 16, 125, 250 and 500 ohms. Complete with 3 super heavy duty 12" PM speakers and 25 ft. cables mounted in separate leatherette-covered carrying cases. 21"x21"x13". The amplifier fits in one of the cases for carrying. This amplifier will put out 40 watts all day long and 50 to 60 watts peak with ease. 3-speed turntable and pickup arm to play all records 33 1/3, 45 and 78 RPM is mounted in the top of the amplifier. Stock No. AP-60X, 50 watt portable P.A. system similar to the 28-watt model pictured above, less microphone. Sale price, \$99.95. Shipping weight, 100 lbs. Shipped via Express or Truck only. Regular \$145.00 list Electro-Voice 610 dynamic microphone with 20 ft. cable and desk stand, \$41.95 extra. For floor stand instead of desk stand, add \$4.95.

\$69.95 BUYS A 28 WATT \$150.00 LIST VALUE PORTABLE P.A. SYSTEM

(Illustration B)

3-SPEED PHONO TOP—TWO 12-INCH SPEAKERS  
7-TUBES PUSH PULL 6L6'S HEAVY LEATHERETTE COVERED PLYWOOD PORTABLE CASES  
CRYSTAL MIKE \$8.95 EXTRA

STOCK No. AP-28X. Portable 28 watt public address system. You get a 7-tube heavy duty push-pull 6L6 amplifier with inputs for 2 mikes either crystal or dynamic with separate mixing volume controls. One phone input. Fully variable tone control high fidelity, wide range frequency response. The heavy duty output transformer has taps for 4, 8, 16, 125, 250 and 500 ohm speaker connections. Two heavy duty 12 inch speakers with 25 feet of speaker cable. Each case has a snap on back and is large enough to give good speaker baffling. Each case is 21 x 16 x 13 inches. One is used to carry the amplifier. A 3-speed phono motor and pick-up is mounted in the top of the amplifier to play 33 1/3, 45 and 78 RPM records. This portable PA system will put out 20 watts all day long and 28 to 30 watts peak music. McGee offers you this \$150.00 list portable PA system at a terrific saving. STOCK No. AP-28X complete portable PA system with 3-speed phono and speakers as pictured (less mike) ship. wt. 71 lbs. \$69.95. Electro-Voice model 910 \$28.50 list crystal mike with 20 feet of cable and desk stand \$6.95 extra. Floor type mike stand instead of desk stand \$4.95 extra.

10-WATT PORTABLE P.A. ON SALE \$42.95

3-SPEED PHONO TOP—10" ALNICO PM SPEAKER

(Illustration C)

5-tube portable 10-watt (14-watt peak) public address system. (Push-pull 7C5) U. L. approved amplifier with wide range response. Inputs for microphone and phono, with separate mixing tone volume controls. Tone control. 10" Alnico V PM speaker is housed in a leatherette case 21"x16"x13" which holds the amplifier for carrying. 3-speed turntable and pickup arm to play all records 33 1/3, 45 and 78 RPM is mounted in the top of the amplifier. List value, \$60.00. Stock No. AP-10X, 10-watt portable P.A. system has only one case and one 10" speaker, less microphone. Sale price, \$42.95. Shipping weight 41 lbs. Shipped via Express or Truck only. Crystal microphone with non-removable desk stand, \$3.95 extra when ordered with the AP-10X portable P.A. system.

McGEE RADIO COMPANY

Prices F.O.B. N.C. Send 25% Deposit with Order; Balance Sent C.O.D. With Parcel Post Orders; Include Postage

TELEPHONE VICTOR 9045. WRITE FOR FLYER  
1422 GRAND AVE., KANSAS CITY, MISSOURI



# BEAUTIFUL WALNUT COMBO' CABINET FOR HOME MUSIC SYSTEM—\$89.95

MADE FOR A \$1000.00 CAPEHART



\$89.95

BEAUTIFUL WALNUT

Beautiful, finest quality walnut combination radio-phonograph cabinet, 42" high, 42" wide and 22" deep. Made for Capehart's finest combination, selling for \$900 and up. Cabinet cost manufacturer over \$200.00. Has highly polished matched walnut panels. Made of 3/4" material. Top 11 1/2" solid stock. This cabinet weighs approximately 175 lbs. The changer, radio and speaker grill all have hinged doors. Radio compartment on right hand side is 14" high and 11 1/2" wide. Made to mount chassis vertically. Changer compartment is 14" high by 20 1/2" wide. Large enough to hold any record changer or recorder mechanism. Front 10" of top compartment is hinged to fold back for easy access to the changer. Both radio and changer compartments come with uncut blank panels. Speaker grille is cut for a 12" speaker and the speaker compartment is 12" high. Stock No. K-375W Capehart is completely enclosed. Shipping weight, 275 lbs. Net price, \$89.95. Walnut.

partment is completely enclosed. Shipping weight, 275 lbs. Net price, \$89.95. Walnut.



**G.I. 3-SPEED CHANGER WITH G.E. \$22.95**  
VARIABLE RELUCTANCE TURN-ABOUT CARTRIDGE

Another tremendous McGee Scout Brand new General Instrument 3-speed automatic record changer. Complete with RPX-050 G.E. variable reluctance cartridge with turn-about stylus. Plays all 3 speeds automatically: 7 1/2, 10 or 12" records. Has repeat button. Repeats last record. Base size, 12" x 12 1/2". Shipping weight 14 lbs. Stock No. 700-GI. Net price, \$22.95.

GI 3-speed changer same as above, but with Webster flip-over twin needle cartridge. Stock No. GI-700. Sale price, \$21.95 each.

**WEBSTER CHICAGO MODEL 114 SALE PRICE \$29.95**



Model 114, 3 speed Webster-Chicago automatic record changer. All brand new in original factory carton. Automatically plays all 3 speeds and all 3 size records. Has new Shure 2 needle flip-over crystal cartridge with muted stylus, to assure the correct needle for the record to be played. Has 3 speed selector lever with neutral position, so that drive wheels will not become flattened, causing distortion. Base size, 13 1/2" x 12". Shipping weight 12 lbs. Sale price, \$29.95 each.

**HALLICRAFTERS S-78 11-TUBE FM-AM CHASSIS**

ONLY \$89.50 WITH 12" COAXIAL \$99.50  
LESS SPEAKER

★ PUSH-PULL WIDE RANGE AUDIO

Hallcrafters S-78, 11-tube AM-FM radio receiver chassis, multi record changer, 600 ohm fidelity audio system. A new model full range tone control, with bass boost. Input for automatic record changer. Output transformer has 3.2 ohm and 500 ohm connections. Chassis size, 12 1/2" x 10 1/2" x 7 1/2" high. Kneels and escutcheon plate are furnished. Standard broadcast and FM, 88 to 108 mc. Shipping weight, 25 lbs. Model S-78, priced less speaker at \$89.50 net. S-78, 11-tube AM-FM chassis with our 12" coaxial PM speaker, both for \$99.50. S-78 with 12" coaxial PM speaker, both for \$107.95.

If you want a record changer, see our special listing above and below.

**NEW GARRARD AUTOMATIC CHANGERS—GE CARTRIDGES**

Garrard RC-80 automatic record changer. Weighs 20 lbs. Separate 45 RPM spindle. Heavy duty motor. Weighted turntable. Has two separate plug-in leads for cartridges. RC-80 changer, less cartridge, ship. wt. 20 lbs. Net price, \$41.43. New Garrard RC-90 3 speed automatic record changer. The finest changer built, less cartridge. Net price, \$51.95. RC-80 changer complete with RPX-050 GE variable reluctance cartridge. Net price, \$47.40. RC-80 changer complete with RPX-052 GE "Golden Treasure" variable reluctance cartridge. Net price, \$60.95. RC-90 changer complete with RPX-050 GE variable reluctance cartridge. Net price, \$56.90. RC-90 changer complete with RPX-052 GE "Golden Treasure" variable reluctance cartridge. Net price, \$64.45.

**50-WATT BOOSTER AMPLIFIER**



**50-WATT BOOSTER AMP. \$39.95**  
2-Mike Pre-Amp \$12.95 Extra.  
Not a Kit, but a Manufactured Amp.

Connect to your amplifier as a booster or use with the PR-2X Pre-amp to add the use of 2 mikes and push-pull parallel 6BL6 output tubes. 50 watt booster amplifier with push-pull parallel 6BL6 output tubes. Stock No. PA-35N. Shipping weight 26 lbs. Sale price \$39.95 ea.

**2-MIKE PRE-AMP.** Pre-amplifier plugs in directly to the PA-35N Booster amplifier. It enables use of 2 Crystal or Dynamic Mikes plus one tube. It is furnished with 4 foot cables and plugs for remote control of the 55 watt Booster. Amplifier, small chassis size a x 3 1/4 x 4". Stock No. PR-2X, with tubes 7F7 and 7N7. Net price \$12.95 ea.

**CROSLLEY RADIO WITH 45 RPM CHANG. \$29.95**

5 tube superb radio (540 to 600) is Broad-cast system 12.8K, 12.8K, 12.8K, 50L6, 50L6, 50L6 Automatic changer for up to 45 RPM records (67 1/2 only). Brand new in original factory cartons. Only 100 to sell at the terrific low price of \$29.95. Shipped Express, only \$37.95. Shipping weight 23 lbs. Mahogany cabinet 11" x 16" x 8 1/2" high. Lid covers 45 RPM records (will not play 78 or 33 1/3 RPM records). Ideal for children and grown-ups alike. Model No. 10-143M. \$29.95.

**McGee's Super High Fidelity Best Value in U. S. A. \$7.95**  
Output Trans. 20-20,000 CPS.

Model A-403 High fidelity output transformer. Why pay \$20 or \$30 for a transformer when our A-403 is available at \$7.95? Immediate. 6000 ohm plate to plate for PP 6L6 or 6V6. 100% feedback winding. 4-8-15-250 and 500 ohm secondary. Housed in a metal case. Net price \$7.95. Recommended for all amplifiers up to 34 watts.

**TERRIFIC FLUORESCENT FIXTURE SALE**

**IS YOUR SERVICE DEPT. PROPERLY LIGHTED? SAVE 50% ON THIS 4-LIGHT FIXTURE**  
**\$12.95, TWO FOR \$25.00 WITH LAMPS**

TOP ILLUSTRATION—This is the finest value in a fluorescent fixture that we have ever offered. Constructed of heavy gauge metal with inside white enamel finish. All General Electric high power factor ballasts. Furnished with General Electric 40" or 60" fluorescent lamps. The fixture may be mounted to the ceiling or in your office. They are properly packed for shipment. These fixtures sold for up to \$30.00. We bought 6 truck loads and are passing our bargain on to you. Why pay more than this to modernize your shop? Shipping weight 26 lbs. each. Net price \$14.95, 2 for \$28.00. Stock No. MK-430X fixture complete. Net \$12.95; 2 for \$25.00.

**DELUXE MODEL WITH GLASS, \$14.95; CEILING CANOPY, \$1.95**

Bottom Illustration  
Deluxe Model No. MK-430X, same as No. MK-430 described above with the exception that it has translucent glass over the lamps to diffuse the light. CEILING CANOPY that is shown, \$1.95 extra. Shipping weight 33 lbs. Net price \$14.95, 2 for \$28.00.

Prices F.O.B. K.C. Send 25% Deposit with Order. Balance Sent C.O.D. with Parcel Post Orders, include Postage

**3 SPEED RECORD PLAYER SALE!**

**PORTABLE MODEL 7843 \$15.95**

Our new 1954 model 3 speed record player, now offered at a special saving. Model 7843, 3 speed portable electric record player, with a powerful 2-tube plus rectifier and full size Alnico V PM speaker. Plays all three speeds and all three sizes. Crystal pickup has an all purpose three-speed needle. Brown reptile finish leatherette case 12 1/2" x 10 1/2" x 3 1/2". Shipping weight 10 lbs. Model 7843, 3-speed portable record player only \$15.95 each.

**3 SPEED WALNUT CAB. PLAYER**

Stock No. WC-374, 3 speed record player in walnut cabinet with hinged lid, so that records can be played with the lid closed. Plays all 3 speed and all 3 size records. Powerful 3 tube amplifier with tone and volume controls. Crystal pickup has two needle flip-over cartridge. Heavy duty Alnico V magnet speaker. Shipping weight 10 lbs. Stock No. WC-374 3 speed record player. Sale price, \$21.95 each.

**GENERAL ELECTRIC CUSTOM MUSIC ENSEMBLE**



**G-E PREAMPLIFIER-CONTROL UNIT**

**Model A1-200 \$56.79**

Combines functions of equalizer, preamplifier plus adjustable treble compensation, program input section, tone controls and volume control. Matches up for the "Custom Music" amplifier. Set up, powered for use with any installation. Net price, \$56.79. Technical information sent on request.

**G-E POWER AMPLIFIER**

**Model A1-300 \$46.80**

A medium power, compact amplifier designed to provide needed speaker power. Essential element in the new General Electric "Custom Music" Ensemble. Delivers high-fidelity performance at very low cost. Net price, \$46.80. Technical information sent on request.

**G-E DUAL COAXIAL SPEAKER**

**Model A1-400 \$41.11**

New approach to coaxial speaker design—high sensitivity at low cost. Exceptional balance between speakers with G-E Acoustic Balancer. Newly developed Pressure Equalizer... a wavefront shaping plug... provides smooth tweeter response. Net price, \$41.11. Technical information sent on request.

**SALE! 1954 MODEL TAPE RECORDER \$74.95**

New, sensational 1954 tape recorder only \$74.95. Priced so that anyone can afford to own one. Small, compact size, 9" x 12" x 12". Beautiful two-tone leatherette case. Complete with microphone, 3" reel of tape and take-up reel. Will record for a full hour on a 7" reel. Fast forward and rewind. Frequency response 70 to 8500 CPS. Heavy duty speaker, 3 watt amplifier, inputs for radio-phonos and mike. Tape speed 7 1/2 IPS. Weighs only 20 lbs. For 110 volt AC operation. Stock No. 907-67, special sale price, only \$74.95. 7" reel of plastic recording tape, \$2.49 each or 4 for \$8.79, extra.



**TELEVISION CAB. WITH DRAWER FOR CHANGER**

Stock No. SE-21, mahogany combination television-phonograph cabinet. 40" high, 24" wide and 18 1/2" deep. Has blank panel and will hold chassis for 17", 20" or 21" picture tube. Be sure to check your chassis measurements to see that it will fit. TV chassis compartment measures 19" high and 20 1/2" wide on the inside. Record changer compartment has pull-out drawer with space 10 1/2" x 13" deep. Baffle cut for 10" speaker. Shipping weight 75 lbs. Via Truck or Rail only. Stock No. SE-21, combination cabinet. Sale price, \$39.95.



**BRUSH CRYSTAL EAR PHONE With Control \$5.49**

Simply clip on to the speaker voice coil of any radio or TV set or to an audio amplifier. No soldering necessary. Listen in privacy to your favorite programs. The thin Brush crystal earphone fits your ear just like a regular hearing aid ear piece. A small remote control box enables using 20 ft. from the radio or TV set. Has its own separate volume control and small matching transformer built-in to operate the crystal from any speaker voice coil. Ideal for hospitals, homes, hundreds of other uses. 10 times more comfortable to wear than conventional earphones. Stock No. BH-500 includes Brush crystal ear piece, remote control box, 20 ft. of cable and instructions. Sale price, \$5.49 complete. Brush crystal earphone with 36" cord. Stock No. BH-51, \$2.95. (You connect it like any crystal earphone, diagram furnished.) Accessory kit includes volume control with switch plus coupling capacity and instructions, 99c extra.

**McGEE RADIO COMPANY**

**TELEPHONE VICTOR 9045, WRITE FOR FLYER 1422 GRAND AVE., KANSAS CITY, MISSOURI**

# Here's how to make HIGH FIDELITY mean what it says!



...a complete  
guide to better  
"hi-fi" equipment  
and results

Just Out! ...

## HIGH FIDELITY TECHNIQUES

by John H. Newitt  
Staff, Mass. Inst. of Technology  
494 pages, 203 illustrations, price \$7.50

Get better results from "hi-fi" by knowing  
all about it!

This big new book by one of the nation's  
acknowledged experts brings you the complete  
"low-down" on modern sound reproduction  
methods and equipment. It shows exactly  
how to get best results at minimum cost; dis-  
cusses all details of circuitry, components  
and equipment; covers the service angles;  
compares the different methods—and is chock  
full of how-to-do-it tips and ideas.

## IT PAYS TO KNOW!

Here are just a few of the subjects covered:  
What to look for in high-fidelity equipment—  
what to avoid • Getting reproduction to suit  
your taste • Some unusual "hi-fi" combinations  
• Hi-fi vs. P.A. type speakers • Loudspeaker  
construction and performance • Adjusting bass-  
reflex cabinets • Controlling distortion • A  
naval horn system • Buffers • Getting rid of  
"overhang" • The best reproducer enclosure  
• Selecting a woofer-tweeter combination  
• Sound-proofing materials • How grillwork af-  
fects attenuation • Output transformer speci-  
fications and what they mean • Special hi-fi  
circuits • Proper crossover frequencies • Do's  
and don'ts of volume expansion • Practical ways  
to suppress noise • A good tone control • Neg-  
ative feedback and how to use it • Pre-amps  
and equalizers • Amplifier construction hints  
• Judging commercial amplifiers • Minimizing  
tuner distortion • Avoiding chatter and cross-  
talk • Limiter-discriminator vs. ratio detector  
FM circuits • All about records and  
record players • Selecting turntables  
and pick-up cartridges • A compre-  
hensive course in magnetic recording  
• Pick-up resonance, its cause and  
cure • Choosing a recorder • Tips  
for custom builders • Special installa-  
tion problems • Typical "hi-fi" in-  
stallations • Bass-reflex calculations  
and design charts ...  
and dozens of other sub-  
jects. Read it for 10  
days AT OUR RISK!  
Use coupon.

10-Day Free  
Examination

Dept. RN-123, Rinehart Books, Inc.,  
Technical Division,  
232 Madison Ave., New York 16, N. Y.

Send HIGH FIDELITY TECHNIQUES by Newitt  
for 10-day FREE examination. If I decide to keep  
the book, I will then remit \$7.50 plus postage.  
Otherwise, I will return book postpaid promptly  
and owe you nothing. (If you send cash with  
order, we pay postage—same return privilege with  
money refunded.)

Name .....

Address .....

City ..... Zone ..... State .....

OUTSIDE U.S.A.—Price \$9.00 cash only. Money  
back if book is returned postpaid in 10 days.

## Servicing in the Home

(Continued from page 49)

or car. Also, from a customer's descrip-  
tion of the symptoms, the technician  
can, in many cases, determine in ad-  
vance which parts he will probably  
need. When a component is required  
which is not available at hand, the  
technician must decide whether to take  
the set to the shop, or get the part and  
complete the work in the home. The  
latter might be more efficient, provided  
the technician checked by phone with  
his distributor to make sure the item  
is in stock and, of course, the distribu-  
tor is not too distantly located.

The tube and parts caddy, shown in  
the right hand of the technician in  
Fig. 1, is ideally suited for carrying a  
selected stock of spare parts and is  
available as a promotion item from  
many parts manufacturers.

The objection to customer annoy-  
ances is easily overcome by the simple  
expedient of politely reminding the  
customer that the labor charge is  
based on time, and the more they get  
in the way, the higher the bill will be.

Standard equipment for home serv-  
icing should include a masonite board  
upon which the chassis and test equip-  
ment may be set to prevent scratching  
the table top; also, a drop cloth for the  
floor is a handy accessory. Above all,  
use common sense and be careful and  
you will avoid damage to household  
furnishings.

When the bill is computed, the labor  
charge must take into consideration  
the high proficiency of the technician.  
The charge-per-hour, in this writer's  
opinion, should be higher than for the  
"tube-pulling" type of service call  
where no test equipment is used. The  
customer should be made aware of the  
time and money saved in not having to  
transport the set to and from the shop.  
He has the set in his home and not in  
some shop for an indefinite period of  
time.

Service technicians doing complete  
outside repairs would require the same  
knowledge as the inside bench techni-  
cian. This means that most outside  
service technicians of today would re-  
quire additional training to enable  
them to do a thorough job in the home.  
Most of these technicians are desirous  
of acquiring greater skills and learning  
more theory. Evidence of this is seen  
by the attendance at the periodic lec-  
tures given by the various test equip-  
ment manufacturers and by the cir-  
culation of service publications such  
as this magazine. Consequently, with  
proper encouragement, there should be  
no lack of qualified technicians. The  
higher salaries these technicians will  
command will be made up by the serv-  
ice operator from the increased busi-  
ness he will obtain from a "complete  
service in the home" policy.

Some of the definite advantages for  
the service operator in home servicing  
are the following:

a. Time and labor are saved when

the chassis is not carried on a round  
trip between the home and shop.

b. The risk of damage to the televi-  
sion chassis while transporting it is  
definitely avoided.

c. Customer confidence is gained  
when the work is performed right in  
his home. Many customers, mindful of  
some unhappy experience, insist that  
the work be done in the home.

d. When the service technician is  
called back to service a new defect, it  
is easier for him to prove that it is a  
new defect.

e. The set is worked on in its own  
location with its usual line voltage,  
outside interference, etc., instead of at  
the shop where conditions may be en-  
tirely different.

f. While the technician is in the  
home, he can test all the tubes on the  
tube checker, replacing those which  
show up as weak. Besides avoiding  
a call-back for a tube which, at the  
time of the service call gave no out-  
ward indication of trouble, extra in-  
come is obtained by the sale of replace-  
ments for weak tubes. Many custom-  
ers, after having their sets repaired,  
inquire as to the status of the other  
tubes. The tube checker gives them  
visual proof of the need for replacing  
one or more. It doesn't require any  
salesmanship to point out to the set  
owner that replacing those tubes today  
avoids extra service charges tomorrow.

-30-

## Tape Editor's Notebook

(Continued from page 51)

signal to start the machine holding  
the incoming part. Then this incom-  
ing tape or disc is backed away a  
few turns from the beginning of  
sound, and a cue mark is made with  
the grease pencil. With the playback  
head set at this cue mark, the out-  
going part is played and the incom-  
ing machine is started on the musi-  
cal cue. During rehearsal, faders on  
both machines should be open, as  
much trial and error is often neces-  
sary before perfect synchronism is  
attained. After the desired effect is  
reached several times in rehearsal,  
the operation is repeated with the  
recorder turned on and the incom-  
ing fader closed. Again the second  
machine is started on cue, the in-  
coming fader is opened, the overlap  
is made and the outgoing fader is  
closed. This process requires pa-  
tience, and occasionally some fancy  
acrobatics, but when handled prop-  
erly it will produce the simulation of  
a continuous performance which can  
almost never be detected.

In the third part of this series we  
shall demonstrate how the sound of  
existing recordings can be improved  
in the transfer to tape. Dubbing  
from various recording media will be  
discussed, with the objectives of better  
tonal quality, reduced background  
noise, and the elimination of ticks,  
pops, and thumps.

(To be continued)

*Sparkling Beauty*  
for the housetops



**WARD'S**  
*DYMON-VANE*  
**CONICAL**



The Circle-vane . . .  
first of Tele-vane  
series for Channels  
2 — 6 VHF.



Dave Chapman, S.I.D.  
Famous designer of  
the Ward Tele-vane  
series of TV Antennas.

## another in the Tele-vane Series

Ward flashes again with the handsome Dymon-vane, the second model in its new series of Tele-vane TV antennas. Reflecting the modern trend and decor the beautiful new Dymon-vane enhances any home and becomes a valuable prized addition. Clean cut in design, a flawless performer, the Dymon-vane stands out as a glittering solitaire among all other TV antennas. A conical antenna with aluminum elements and black permatube cross arm with wrought adornments, the Dymon-vane is designed for complete coverage of VHF Channels 2 — 13 in metropolitan, suburban and fringe areas.

The New Dymon-vane comes in single bay or two bay stacked models . . . folded and pre-assembled ready for easy installation.

**THE WARD PRODUCTS CORP.**

DIVISION OF THE GABRIEL COMPANY

1148 Euclid Avenue, Cleveland 15, Ohio

In Canada: Atlas Radio Co., Ltd., Toronto, Ont.



## JOBBERS • EXPORTERS • IMPORTERS MANUFACTURERS • SCHOOLS

Tubes 10 to 50% below manufacturers cost. Nationally known standard brands only—100% RMA guaranteed.

1A4-1A4P	\$.81	1H6GT	\$.67	7E5	\$.35	34	\$.70
1A6	.30	1J6G	.30	7E6	.48	35Z4GT	.45
1AB5	.55	1J6GT	.30	7H7	.50	35Z51	.48
1B5-255	.28	2A6	.55	12A5	.52	36	.54
1B7GT	.28	2A7	.54	12F5GT	.46	37	.46
1C6	.36	2B7	.54	12J7GT	.39	38	.48
1C7G	.73	2E5	.61	12K6GT	.60	39/44	.22
1C9	.49	3B7	.67	125F5GT	.52	40	.48
1D7G	.42	3C6-XXB	.75	125R7GT	.59	45Z3	.46
1D8GT	.82	3D6	.67	12Z3	.55	46	.54
1E5GP	.82	6B6G	.67	1457	.48	49	.54
1E7GT	.28	6C8G	.60	14Y4	.48	50	.82
1F4	.45	6L5G	.54	22	.48	56	.36
1F5G	.48	6P5GT	.48	25A6G	.67	57	.48
1F6	.81	6R7GT	.54	26	.42	58	.48
1F7G	.82	657G	.69	31	.67	77	.43
1H4G	.28			32	.67	85	.48
1H6G	.67	7C4	.35	33	.67		

Write for quantity discounts! Deduct 10% for quantities of 100 of a type or 100 assorted. Orders for less than 100 will be shipped individually cartoned; orders for 100 or more of a type will be shipped in original manufacturers cartons bulk packed, or individually cartoned if requested.

Jobbers! Manufacturers! Write on your letterhead for our new catalog featuring lowest prices on electronic components.

TERMS: 25% with order, balance C.O.D., except to rated concerns. Minimum order \$5.00; all merchandise subject to prior sale and F.O.B. Chicago.

### MID-AMERICA CO., INC.

Office: 2412 S. Michigan  
Chicago 16, Ill.

Warehouse Showroom: 2309 S. Archer  
Phone: Victory 2-7820

For The Very Finest  
in High Fidelity

**MASCO**

*Concert Master*



20-Watt Amplifier  
with Remote Pre-Amplifier

Unequaled realism of tone. The ultimate in high fidelity for the critical music lover. A few of its outstanding features:

- Less than 0.2% harmonic or intermodulation distortion at 20 watts, from 20 cycles to 40,000 cycles.
- Frequency response 10 to 50,000 cycles  $\pm 1/2$  db at 20 watts.

List Price  
CM-20 20-Watt High-Fidelity Amplifier \$386.50\*  
CMR-20 20-Watt High-Fidelity Amplifier with remote pre-amplifier in hand-rubbed mahogany cabinet with 6-foot cable and plug. \$295.00\*  
\*Plus F.E.T.

Write for Catalog CM-53

**MASCO**  
MARK SIMPSON Mfg. Co., Inc.  
Long Island City 3, New York

### Editors and Engineers PUBLICATIONS

#### BETTER TV RECEPTION

New 2nd Edition

IT COVERS ALL YOU WANT  
TO KNOW ABOUT  
fringe and low-signal areas

BETTER TV RECEPTION has become the standard guide for the installation technician and a popular text for TV enthusiasts.

Book No. E&E-TR2

**\$2.50 per copy \***  
(paperbound) at our store



#### For Additional Coverage

**RADIOTELEPHONE LICENSE MANUAL.** Typical study questions with concise answers for any commercial U.S.A. radiotelephone operators license. Book No. E&E-RL1.....\$3.75\*

**RADIO HANDBOOK. GIANT 13TH EDITION.** A one-volume library of radio information with extensive, simplified theory. Detailed how-to-build-it data on dozens of items of practical radio equipment. Book No. E&E-RH13...\$6.00\*

**SURPLUS RADIO CONVERSION MANUAL. VOL. 1.** Practical conversions. Write for list of contents. Book No. E&E-SM1.....\$2.50\*

**SURPLUS RADIO CONVERSION MANUAL. VOL. 2.** Companion to Volume 1. Book No. E&E-SM2.....\$2.50\*

\*Plus any tax.

**BUY FROM YOUR DISTRIBUTOR**  
ADD 10% ON DIRECT MAIL ORDERS TO  
EDITORS AND ENGINEERS, LTD.  
BOX 889A SANTA BARBARA, CALIF.  
Baltimore order from BAKER & TAYLOR, Baltimore, Md.

### Amateur Facsimile (Continued from page 48)

100 microamperes at the last dynode was obtained by the use of about 800 volts across the nine stages of the photomultiplier. Thus, video signals on the order of 1 to 2 volts were available for application to the mixer.

As a result of the policy of using what was at hand, the power transformer in this supply is somewhat heavy for the actual requirements. The unit, a Thordarson T21P89, is rated at 250 ma. with a d.c. output of 450 volts d.c. in normal full-wave power supply service. The current requirements of the photomultiplier system are quite small and any transformer that will give 800 volts, as connected in Fig. 9, will do.

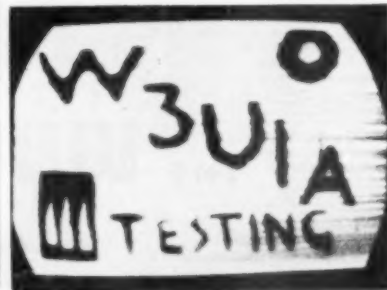
The sync, mixer, and r.f. unit, shown diagrammatically in Fig. 8 contained a 30-second time-base generator built around a 6AK5 tube but almost any pentode would have been satisfactory. The anode of the tube was connected directly to one of the Y plates of the oscilloscope, and the grid circuit of the tube had a 2-pole, 3-position switch incorporated in it. The purpose of this switch was to initiate the time base during normal operation and also to provide the maximum and minimum plate voltages in setting up the vertical shift circuits on the flying-spot scanner.

The line sync-pulse generator consisted simply of a 15-cps multivibrator built around a 6J6 tube and synchronized to the line frequency. The waveform developed at one of its plates was differentiated and fed via a diode to the oscilloscope and the mixer unit. The mixer unit consisted of a resistance network arrangement as shown, the output being fed directly to the suppressor of a 6AS6 tube used as an oscillator. This tube was chosen as a low-power oscillator because its suppressor grid characteristic afforded good d.c. modulation of the radio frequency output.

#### Receiver

A war-surplus receiver type BC-AR-229 was used at the receiving station and its video output was fed via a one-stage amplifier directly from the

Fig. 10. A sample picture from the simple facsimile system. With gamma correction and a better optical system resolution equal to television should be obtainable.



RADIO & TELEVISION NEWS

**A**gain proving  
tube-design  
leadership...

## 40% OF 1952's NEW RECEIVING TUBES WERE G-E DEVELOPMENTS...TWICE ANY OTHER MAKE

**F**OURTEEN out of thirty-five registered *new* receiving-tube designs—40%—were G-E, in the last calendar year, 1952. As still further proof of leadership... new G-E types numbered more than twice those of any other manufacturer!

Outstanding research and development by General Electric have given to the TV-radio industry its newest, most advanced tubes. You can be sure, when servicing latest-model receivers, that G-E tubes are available for every need—that G-E leadership

in tube development brings you the finest obtainable product. Every working day, you will receive extra dividends in superior performance and reliability.

*You can expect more new and improved tubes from General Electric in the months ahead—types that will make your work easier and cut call-backs. Keep in touch with your G-E tube distributor for forthcoming new-tube announcements, each with a profit message for you! Tube Dept., General Electric Co., Schenectady 5, N.Y.*

SHOWN BELOW: a few of the many new G-E tubes that are making money for service dealers.



*You can put your confidence in—*

**GENERAL  ELECTRIC**

## FREE CATALOG

JUST OFF THE PRESS—OUR NEW  
SURPLUS CATALOG! SEND FOR YOUR COPY!

### ANTENNA EQUIPMENT



#### MAST BASES—INSULATED:

MP-132 BASE—Illustrated at left—1" heavy coil spring, 2" insulator. Overall length: 11 1/2". Weight: 2 1/2 lbs. Price: .....\$5.95

MP-8-33 BASE—Insulated type with heavy coil spring and 9" dia. insulator. Requires 2" hole for mounting. Weight: 9 lbs. ....\$5.95

#### MAST SECTIONS FOR ABOVE BASES

Tubular steel, copper coated, painted, in 3 ft. sections, screw-in type. MS-53 can be used to make any length with MS-52-51-50-49 for taper. Any section.....30c Each  
Larger Diameter Section MS-54.....\$1.25

### TRANSFORMERS

#### 110 V. 60 Cycle Primaries

5 Volt CT-25A-10,000 V. Ins. OPEN Frame—5" x 3" x 4 1/2".....\$7.95  
6.3 V. 1 Amp.....1.25 24 V. 1 Amp.....1.95  
24 V. 1/2 Amp.....1.50 24 V. 6.5 Amp.....5.95  
6-24 or 30 Volt 8 Amp.....5.95

AERIAL WIRE—Phosphorus Bronze #16 Stranded, 200 lb. test. Weatherproof, 150 Feet \$1.50 on Reel, RL-3 with Clips

Telephone Wire—3 Cond. copper & \$4.75 steel, 525 Ft.

### COAXIAL CABLES:

RG-8/U (SPECIAL) 51.5 ohms. Same size as RG-8/U. Prices: 1 to 100 ft. @ 8c per ft.—100 to 500 ft. @ 7 1/2c per ft.—1000 to 10000 ft. @ 7c per ft.—10000 ft. Reels @ 6 1/2c per ft.  
RG-34/U 71 ohms, 145 ft. length.....\$15.00

### DYNAMOTORS:

INPUT: OUTPUT: STOCK No.: PRICE:  
14 V.D.C. 330 V. 135 MA. DM-330 \$7.95  
12 V.D.C. 250 V. 50 MA. DM-25 8.95  
12 or 24 V.D.C. 500 V. 50 MA. USA/0515 6.95

DYNAMOTOR UNIT—PE-133—12 Volt input; output 230 VDC 90 MA. Filtered. Dyn.: 5 1/2" x 3 1/2". F.H. Base: 3" x 4" x 5". NEW: \$7.95

DYNAMOTOR UNIT—PE-103—6 or 12 Volt input; output 500 Volts 160 MA. Complete with battery cables, circuit breakers, and filter base. Prices: NEW: \$19.95 USED: \$15.95  
OUTPUT CABLE 1/2 PE-103—8 ft. CD-501.....\$2.95

DYNAMOTOR—PE-101—6 or 12 Volt. (Reprints of original CQ converter articles—Oct. & Dec., '52 issues, furnished.) This is the Dynamotor the Hams have been talking about! Easily adapted to supply 625 V. @ 150 MA. and 325 V. 125 MA. @ 12 Volts—or 300 V. 90 MA. and 160 V. 110 MA. @ 6 Volts.....NEW: \$4.95

### BATTERY SWITCHING UNIT and

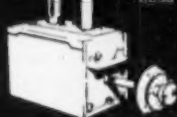
METER Used to switch lead from one battery to another—or 6 to 12 Volts. Contains 2" Meter—0-15 Volt DC Scale for reading battery voltage. 20 Amp DPDT Switch and indicator. Case size: 4" x 6 1/2" x 4 1/2". NEW: \$2.95

## FAIR RADIO SALES

132 SOUTH MAIN ST.  
LIMA, OHIO

### HI-GAIN TUNER-BOOSTER

LESS TUBES WITH DIAL



\$4.75

COMPLETE WITH TUBES

\$6.00

Solve poor TV reception with a Hi-Gain Booster. Banish weak fringe areas, reduce snow. This unit comes to you as a highly serviceable High-Gain Tuner. Uses 6-16 Tubes in very efficient Hi-Q Circuit. Has 8 tuned circuits using pure silver inductances and individual compensation providing high gain on all channels. Built in S.I. Varactor Drive.

All necessary parts and instr. included makes highest gain booster on the market reg. of price.

### \$10 VALUE FOR \$1.00

130 Assorted 1/2, 3/4, 2W RESISTORS

Shipments sent postpaid when full payment is enclosed. 25% deposit on C.O.D. Send for our new bulletin.

FRANK W. DECRY & ASSOC.

11842 W. Jefferson Blvd. Culver City, Calif.

### SOUND POWERED HEAD AND CHEST SET

Navy Type—No Batteries Required—Ideal for TV Antenna Installations and many other uses. 20 Ft. Cord. Used.....\$5.95 EA.



### TELEPHONE WIRE FOR THE ABOVE

COMBAT TYPE—2 Cond. Twisted, Rubber Covered, Medium Weight, W-130.....@ .01c per Ft.

FIELD WIRE—2 Cond. Twisted, Weatherproof, Heavy Duty, W-110—525 Ft. Roll.....\$4.75

COPPER WELD WIRE—Weatherproofed, 2 Cond. Solid. 1200 Ft. Roll, \$10.00, Per Ft. @ .01c per Ft.

### RECEIVER AND TRANSMITTER

RECEIVER BC-229 or 429—TRF Receiver with 3 Plug-in Coils to cover Freq. Range 201 to 398, 2500—4700, 4150—7700 KC. With 6 Tubes: 1/37—1/38—3/39. Power Supply required, 6 or 12 Volt & 250 Volts. Size: 15" x 8 1/2" x 7". Schematic included.....USED: \$8.95

TRANSMITTER BC-230—Voice modulated Trans. with 3 Plug-in Coils to cover Freq. Range 2500 to 7700 KC. With 4 Tubes: 2/10y—2/45 & RF Meter 0-1.5 Amps. Power Supply required, 6 or 12 Volt & 350 Volts. Size: 15" x 8 1/2" x 7". Schematic included.....USED: \$8.95

Special Buy—Both Rec. & Trans.: \$15.00

TRANS. CONTROL BOX BC-232 w/Plug.....\$1.50

REC. CONTROL BOX BC-231 w/Plug.....\$1.50

PLUG 1/Rec. PL-61.....75c F/Trans. PL-64.....75c

### BLOWERS—115 VAC 60 CYCLE

SINGLE TYPE: (Illustrated at left) 100 CFM, 2 1/2" intake; 2" outlet. Complete size: 5" x 6". Order No. 1C930.....\$8.95

DUAL TYPE: Each Side, 4" intake; 2" outlet. Complete size: 8" x 6". Order No. 1C980.....\$13.95

COMPACT TYPE: 100 CFM. Motor built inside squirrel cage. 1 1/2" intake; 3/4" x 3" Dis. Complete size: 4 1/4" W x 8 1/4" H x 8 1/4" D. Order No. 2C067.....\$14.50

FLANGE TYPE: 140 CFM, 3 1/2" intake; 2 1/2" Dis. Complete size: 7 1/2" W x 7 1/2" H x 6 1/2" D. Order No. 1C807.....\$13.95

FLANGE TWIN: 275 CFM, 4 1/2" intake; 3 1/2" x 3" Dis. Complete size: 11 1/2" W x 8 1/2" H x 8 1/2" D. Order No. 2C069.....\$21.95

### HORSIE-TALKIE

### TRANSCEIVER

TRANS.—REC.—PORTABLE, READY TO OPERATE. BC-745 TRANS.—REC.: Crystal Controlled, covers Freq. 3 to 6 MC. by use of Plug-in Coil. With PE-157 Power Supply. BD-51 2 Volt Battery, Speaker, Antenna, Mic., and Crystal for 5030 KC. Set size: 5" x 5" x 5", mounted on Staff 38" Lg. Power Supply operates from 2 Volt Wet Battery rechargeable from 6 Volts and houses Speaker. Price: USED: \$49.95

Tested—Complete.....\$49.95

T-30 CHEST SET—Has Speaker & Space for Dry Cells.....\$4.95

BC-745 TRANS. & REC.—CHASSIS ONLY—No Cover, Staff or Antenna, but w/Tubes.....\$14.95

NEW ANTENNA—Telescoping, for above set.....\$2.00

Address Dept. RN • Minimum Order \$5.00 • Prices F.O.B., Lima, O. • 25% Deposit on C.O.D. Orders

detector of the receiver to the Z axis input of the Du Mont oscilloscope, type 304H, as shown in Fig. 7. The oscilloscope was synchronized by means of the output of the sync-pulse discriminator, and the Y plates were d.c. connected to the output of a 30-second time-base generator as shown in Fig. 5. For convenience a "Polaroid Land" camera was used for recording the received pictures although a larger picture could be obtained using ordinary roll film in a conventional camera with a portrait lens attachment.

A box camera may be used by providing a light-tight box to support the camera a foot or so away from the scope face, and installing a portrait lens attachment to reduce the focal length of the camera lens.

To initiate operation, switch S<sub>1</sub> of Figs. 7 and 8 are thrown from position 2 to position 3 simultaneously. For on-the-air tests, the start signal could be transmitted orally by the microphone, or by a tone signal to actuate a frequency-sensitive relay.

### Results

A typical example of the recorded pictures is shown in Fig. 10. Black-and-white copy gave the best reproduction because no gamma correction has been incorporated into the system. With gamma correction and a better optical system for use with the flying-spot scanner, pictures should be produced with the resolution of television pictures.

However, the simple and economical system described in this article should be capable of stimulating an interest in facsimile transmission in the ranks of radio amateurs, and it is hoped that this article may be instrumental in opening up a new field of amateur activity.

### DAMAGED 6V6 IN RAYTHEON 16AX23 TV SETS

By GEORGE ANGLADO

MORE than one of these sets have come into the shop with a blown-out fuse and damaged 6V6 tube. We couldn't understand how a tube could be damaged by a simple fuse blowout. However, upon examination of the schematic, it was found that the fuse was connected in the plate supply line of the 6V6 tube. When the fuse blows, the plate supply is cut off, but the screen has 240 volts applied to it which results in a damaged tube.

Future trouble was eliminated by disconnecting the red lead of the vertical output transformer from "B+" and connecting it to pin 5 of the power jumper socket.

### PRODUCTION HIGH

AUGUST production of both radio and TV sets was at the highest level for that month since 1950, according to figures released by the RETMA.

603,760 TV receivers and 991,637 radios were produced during August as against 397,769 video sets and 607,402 radios for the same period last year. TV total for the first eight months is 4,754,285 units.

RADIO & TELEVISION NEWS

### FACTORY REPAIRS

ON ALL MAKES AND TYPES OF

TEST EQUIPMENT

Write for BIG NEW FREE Catalogue

GENERAL ELECTRONIC DIST. CO.

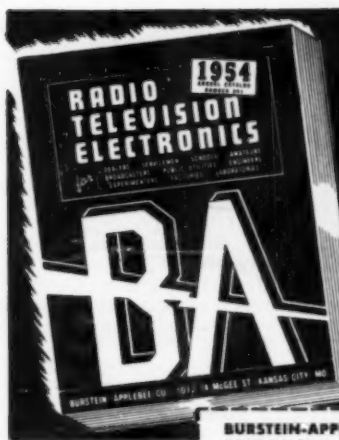
98 PARK PLACE, NEW YORK 7, N. Y.

### TRAIN FOR A SUPERVISORY POSITION IN ELECTRONICS

Thorough 2-year course covers electrical circuits and machinery, basic electronics and industrial electronics. Franklin Technical Institute graduates are in demand as junior engineers for research and test work, sales engineering, supervisory work on production lines and drafting room design work. Other engineering and technical courses. Coed. Day, evening, 45th year. Write for catalog.

FRANKLIN TECHNICAL INSTITUTE

46 Berkeley Street Boston 16, Mass.



HERE ARE JUST A  
FEW OF THE  
**BIG  
VALUES**  
IN THE 156 PAGE  
1954  
**B-A CATALOG**  
WRITE US, IF YOU HAVE  
NOT RECEIVED IT

**FREE  
1954  
B-A CATALOG**

**BURSTEIN-APPLEBEE CO.**  
1012-14 McGee St., Kansas City 6, Mo.

☐ Send Free B-A Catalog No. 541  
☐ My order attached for items in this ad.

\$ \_\_\_\_\_ enclosed.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

**ALL ALUMINUM PORTABLE FOLD-AWAY TABLES**

Powerfully constructed of aluminum top and tubular aluminum legs. Full table height. New patented Saf-T-Lock Hinge. Versatile, go-anywhere, all-purpose tables for 1001 uses. "Just it" for the Radio or TV Serviceman to provide work table at service jobs in the home, for anyone for on the spot table needs, anywhere. Fine for workshop, in home for cards and serving, for picnics, in business for displays, counter, even as an attractive desk. Sturdy—supports up to 1000 lbs. Tables fold or unfold easily, quickly—easy to carry as luggage, have leather handle, take little room in car, store on edge when not in use.

No. 40A183. Size 24"x60" open, closed 24"x30". Shpg. wt. 21 lbs. List Price \$21.95. **NET EACH \$15.95**

No. 40A184. Size 30"x72" open, closed 30"x36". Shpg. wt. 27 lbs. List Price \$29.95. **NET EACH \$20.55**



**TV TRUCK**

Makes Home Demonstration, Delivery and Pick-Up for Service of TV Sets a 1-Man Job. Equipped with special stair climbing feature for safe movement on steps; engineered to handle largest or smallest set—console or table; reduces set and cabinet damage from handling; lightweight, compact; equipped with 8-in. semi-pneumatic ball bearing wheels. Folding tray supports table set 15" above floor. . . folds back for consoles. Supplied with strap that fastens securely around set in moving. Constructed of tubular steel, grey finish. Shipped K.D. in flat carton 20"x39 1/2"x43 1/2". Shpg. wt. 25 lbs.

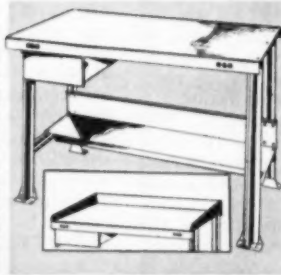
No. 40A205. **NET EACH \$23.95**



**SHOPMASTER WORK BENCH**

Sturdy all steel (16 gauge) construction. 48" long x 24" wide working surface of 1/2" masonite on steel top. Stands 32 1/2" high and has bottom shelf for tools and equipment. Smooth sliding 12" wide, 18" deep, 5" high drawer handy for small tools. Has provision for padlock. Steel form channel legs provide extra strength. Supports vises, drill presses, jig saws, grinders, etc., with ease. 6 built-in receptacles ready for wiring to electrical power. Grey finish. Rear and side risers optional. Shipped K.D. wt. 80 lbs.

No. 6A94. Net Each **\$24.75**  
Rear and Side Risers.  
6A95. Wt. 6 lbs. Net Each **\$4.50**



**COMPLETE AM-FM HI-FI  
RADIO CHASSIS**  
NATIONALLY-KNOWN MAKE

REGULAR  
\$138.50  
NET VALUE  
FOR ONLY  
**\$99<sup>50</sup>**

DeLuxe Tuner Chassis and Amplifier power supply in separate units with 20 Tubes including tuning eye and rectifiers assures maximum efficiency of each unit and provides more latitude in installations.

The Tuner, an AM-FM Superhet Features: Built-in Pre-amp for use of GE or other Variable Reluctance Cartridges, as well as Crystal type, 6-gang Tuning Condenser, AVC, Separate Full Range Bass and Treble Controls, Fly Wheel Tuning Drive, Tuning Eye.

Separate Tuned RF stages are employed on both the AM and FM bands to provide extreme sensitivity and minimize spurious responses. The FM circuit also includes two stages of high gain IF amplification and a ratio detector circuit of advanced design—all stabilized against drift.

Tunes AM: 535 to 1720 KC—FM: 88 to 108 MC. Sturdily built with pleasing panel, indirectly illuminated "Slide" Rule Dial. Controls at front include 3-position selector switch for Phono, AM, FM radio. AC phono outlet in rear. Supplied with AM loop antenna and FM flexible dipole with provision for external antennas.

Tube complement: 2-6BA6, 2-6BE6, 6C4, 6SG7, 6SH7, 6J5, 6SQ7, 6AL5 and 6AU6. Supplied complete with tubes, antennas and hardware.

The Power Supply and Audio Amplifier, designed specifically for above, features Parallel Push-Pull Beam Power Output . . . 18 watts undistorted, 25 watts max. power. Extended Range Hi-Fi Response. Inverse Feedback, Output Impedance 4, 8, 15, 250 or 500 ohms. Tube Complement: 2-6J5, 4-6V6, 2-5Y3. Supplied complete with tubes and connecting cable.

Dimensions—Tuner: 13 1/2" W. x 8 1/2" H. x 9" D. Wt. 10 lbs. Amplifier: 13 1/2" W. x 7 1/2" H. x 7" D. Wt. 18 lbs. Operate from 105-125 volts AC; 50/60 cycles. Shpg. wt. of both 31 lbs.

No. 31B217-2. Tuner and Amplifier  
Complete Ready to Operate. Both for Only **\$99.50**

**COMBINATION DEAL**—Above Tuner and Amplifier with Gairard Changer and GE Variable Reluctance Turnabout Cartridge.  
Deal No. 31A282. Shpg. wt. 53 lbs. **Special \$139.50**

**HANDY METAL STORAGE CABINETS  
WITH CLEAR PLASTIC DRAWERS**



Provides an easy-to-find arrangement for small items in store, office, shop, home . . . anywhere.

The ideal storage cabinet for stocking and storing of hardware, small parts, tools, etc. Made of sturdy steel, handomely finished in baked grey enamel. Can be stacked side by side, back-to-back or one on top of the other. Heavy molded plastic drawer features a name plate holder, safety catch to prevent accidental spillage. Size of drawers 5 1/4"x2 1/2"x1 1/4", each provided with two removable plastic dividers making possible 3 compartments to each drawer. Overall depth all size cabinets 6".

12 Drawer, 6" H. x 12 1/2" W. **\$5<sup>83</sup>**  
No. 36B85. Wt. 6 lbs. Net Each . . .

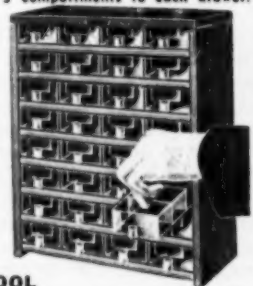
16 Drawer, 8" H. x 12 1/2" W. **\$6<sup>81</sup>**  
No. 36B89. Wt. 8 lbs. Net Each . . .

20 Drawer, 10 1/4" H. x 12 1/2" W. **\$7<sup>79</sup>**  
No. 36A147. Wt. 9 lbs. Net Each . . .

32 Drawer, 15 1/4" H. x 12 1/2" W. **\$12<sup>69</sup>**  
36A118. Wt. 10 1/2 lbs. Net Each . . .

64 Drawer, 15 1/4" H. x 25" W. **\$24<sup>45</sup>**  
40A154. Wt. 25 lbs. Net Each . . .

128 Drawer, 30 1/2" H. x 25 1/4" W. **\$54<sup>83</sup>**  
No. 45W12. Wt. 50 lbs. Net Each . . .



**AMP HAND TOOL  
CRIMPS SOLDERLESS TERMINALS TO WIRE . . . SHEARS BOLTS  
. . . CUTS, STRIPS AND GAUGES WIRE**

Never before a single Tool with so many uses. Crimps solderless terminals (see page 81) to wire ends; Shears bolts sizes 10-24, 10-32, 8-32, 6-32, and 4-40 to desired length without damaging threads; Strips, Cuts, and measures wire, sizes 22 to 10.

No. 15B268. **\$3.97**  
Each . . .

Asst. of 100. Solderless terminals, most popular sizes. **\$1.27**  
No. 16AB24. Per Asst. . .



Have you had the  
Chassis Touching  
JITTERS  
Lately?



## Adjust-A-Volt

### VARIABLE TRANSFORMER

with isolated primary winding lets you service any TV or radio set made without a chance of a "bite" . . . no more chassis touching jitters.



This husky 1/2 KVA electro-statically shielded unit is "Must" test equipment for thousands of service men. Intermittent operating TV or radio sets are checked by dropping line voltage to 105 V or lower to detect a faulty oscillator. Also used to cook a set at 130-140 V to break down intermittent part. On any application where either isolation or a variable transformer is needed Adjust-A-Volt will do the job. Black wrinkle finish, jeweled pilot light and convenient fuse. Write for new 18-page catalog listing all types and sizes, or see your Adjust-A-Volt distributor.

**STANDARD  
ELECTRICAL PRODUCTS CO.**

2238 E. THIRD ST. • DAYTON, OHIO

# RADIO-TV Service Industry News

## AS REPORTED BY THE TELEVISION TECHNICIANS LECTURE BUREAU

THE managing director of the Television Technicians Lecture Bureau recently made an announcement of a new program that is of special significance to every man who operates a full-time service business, whether it is a one-man shop or a fifty-man organization.

This announcement stated that the Bureau was commencing a service business registration program for the purpose of compiling and publishing a National Electronic Service Directory. The major purpose of this program is to establish the identity of businesses engaged in the servicing of radio, television, sound, and electronic products and to pave the way for direct contacts by manufacturers with competent service companies as new types of electronic devices are developed. Also, there are strong indications that closed-circuit television will go through a period of rapid growth during the next few years. Manufacturers of closed-circuit TV systems will need to locate qualified independent servicing companies in all sections of the country as the applications for these systems expand.

The National Electronics Service Directory will be presented alphabetically by states, with cities and towns listed alphabetically under each state. The listings of the individual service businesses will also be made in alphabetical order with each listed service business coded to identify its size and facilities.

No charges will be made for a conventional style of listing. The only requirement is that the business must be an established service business requiring the entire time and attention of at least one man. Service businesses listed will include all types of companies that handle the installation and servicing of electronic products. The business can be either an exclusive servicing company or it may be a full-fledged department of a retail establishment.

It is felt that the publication of the National Electronics Service Directory will bring six distinct advantages to the independent servicing industry:

1. It will establish the fact beyond question of a doubt that radio, televi-

sion, sound, and electronics servicing is handled by an established independent industry and not by a shifting mass of nameless and faceless electronic mechanics.

2. It will put the fact on record that the bulk of the service business is being handled by legitimate service businesses ranging in size from one-man shops to organizations employing ten or more technicians.

3. It will show that competent independent service facilities and personnel are available in all sections of the country—businesses fully capable of handling any type of radio, television, sound, or electronic installation and maintenance if the right kinds of information are made available to them.

4. It will provide the reasons why set manufacturers need not set up their own national or distributor-operated service organizations to handle the installation and servicing of color television receivers.

5. It will help manufacturers of closed-circuit TV systems and of electronic control devices to directly contact competent service companies in all sections of the country where their products may be sold.

6. It will help to channel more industry money into public relations and other programs that are of distinct value to established service businesses.

All listings in the National Electronic Service Directory will be coded to show organizational information and the categories of service each business is currently handling.

It is the Bureau's plan to make copies of this directory available to the more than four thousand manufacturers that are now engaged in producing a wide variety of radio vacuum-tube devices, many of which are for limited applications. It will make it possible for such manufacturers to contact competent service operators in any city or section where their devices are sold.

### Color TV Service

Some service authorities feel that many set manufacturers will arrange to provide either direct factory service or distributor service to buyers

**RADIO & TELEVISION NEWS**

of color television receivers. They feel that annual service contracts will be widely used again to insure prompt and efficient service on color sets. Service sold on an annual contract basis enables the service company to maintain a stable, year-round staff of competent technicians and cushions the drop in service income during the normally four bad mid-year months.

It is felt that the information on service businesses that will be provided in the National Electronics Service Directory will convince most set manufacturers that color TV installation and maintenance can be capably handled by the independent service businesses now in operation.

An official form has been prepared for service directory registrations. No listing will be made except those submitted on the official TTLB form. These forms are available without charge from most electronic parts distributors. Copies may also be obtained by sending a stamped and addressed envelope to TTLB Directory Department, P. O. Box 1321, Indianapolis 6, Indiana.

#### Cost of Doing Business

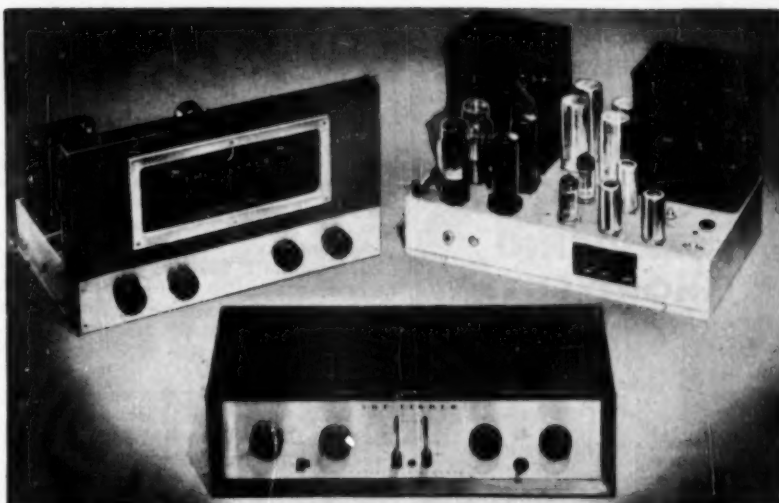
Even the smallest service operators are taking a sharp look at their costs of doing business. With living and operating costs at a high level, a man cannot stay in business very long unless he is able to make a living for himself and pay for all of his costs of operation.

Further, set owners are gradually getting wise to the sharp boys who advertise low service charges and then stick their customers for tubes and parts—many of which they don't put in. Now and then we get reports of set owners who have allowed the "price" operator to fix their sets, got an itemized bill for the tubes and parts and then refused to pay for the service because they were charged for parts that were not used. There isn't a thing the sharpie can do except take his loss of time and those parts he did not put in. The law is on the customer's side.

More and more district attorneys are leaning toward the opinion expressed by Tarrant County's District Attorney, Howard M. Fender, in the talk he made at the Texas Electronic Association's convention in Ft. Worth, Texas:

"I hate a cheater worse than almost anything else in the world . . . a man who will take advantage of the ignorance of his customers in order to perpetrate a fraud upon them is less than nothing in my sight, and I have no use for him. I am personally willing to bend whatever energies are present in my office to prosecute a person of that type."

Russ Hansen, of *Motorola, Incorporated*, has developed some very interesting tables on the cost of operating a TV service business. Mr. Hansen has pointed out consistently in his talks on service business management that the ratio of payrolls to service



**"Of the very best!"**

—HIGH FIDELITY MAGAZINE

# FISHER

## SERIES "50"

■ It is only natural that more than one manufacturer will claim *his* product is the best. For that reason it remains for *you* to be the judge. We say—*demand the specs.* Then check workmanship, performance and beauty of appearance. If you do all these things, the answer will inevitably be . . . THE FISHER SERIES "50." There is no finer made.

### THE FISHER Master Audio Control MODEL 50-C

■ "One of the finest units yet offered to the enthusiast or audio engineer."  
—*Radio and TV News.* Can be used with *any* amplifier. IM distortion virtually unmeasurable. Complete, professional equalization settings and tone controls; genuine F-M loudness control; five inputs, five independent input level controls, two cathode follower outputs. Self-powered.

Chassis, \$89.50 • With blonde or dark cabinet, \$97.50

### THE FISHER FM-AM Tuner MODEL 50-R 70-RT

■ Features *extreme sensitivity* (1.5 mv for 20 db of quieting); *low distortion* (less than 0.04% for 1 volt output); *low hum* (more than 100 db below 2 volts output.) Armstrong system, *adjustable AFC* with switch, *adjustable AM selectivity*, separate FM and AM front ends (shock-mounted), cathode follower output, fully shielded, aluminum chassis, self-powered. **\$164.50**

Model 70-RT, same as Model 50-R, but including tone controls, phono-graph preamplifier-equalizer, and loudness balance control. **\$184.50**

### THE FISHER 50-Watt Amplifier MODEL 50-A

■ Truly the world's finest all-triode amplifier, yet moderately priced. A man's size unit! Less than 1% distortion at 50 watts (.08% at 10 watts.) IM distortion below 2% at 50 watts. Uniform response within .1 db from 20 to 20,000 cycles; 1 db, 5 to 100,000 cycles. Hum and noise more than 96 db below full output. Quality components throughout. **\$159.50**

*Prices slightly higher west of the Rockies*

WRITE TODAY FOR COMPLETE SPECIFICATIONS

FISHER RADIO CORPORATION • 39 EAST 47th STREET • N. Y.

**JUST OUT!**

the book that teaches  
you fast, expert  
service techniques

## "AM-FM SERVICING SHORT-CUTS"

by Milton S. Kiver

Based on  
Actual  
Case  
Histories

shows you how  
to solve  
tough jobs  
**FAST**



### Pays For Itself on Your First Repair

This practical book describes a series of actual AM and FM service case histories, each presenting a specific problem about a specific receiver. The symptoms of the trouble are described and then followed by a step-by-step explanation of how the service technician localized and tracked down the defect. Finally, there is a detailed explanation of how this particular trouble can be tracked down and solved in any receiver.

The book is divided into ten sections, each of which deals with specific troubles, such as hum, oscillations, weak sets, etc. The handy index makes it possible to refer instantly to the specific troubles and solutions discussed in the various case histories. The discussions which follow each case history are invaluable—they explain how to apply the proper time-saving techniques to any AM or FM receiver. Here, in one handy volume, is the successful experience of experts—to make your service work easier, quicker, more profitable. 152 pages, 5½ x 8½".

The Book that Pays for Itself  
on a Single Service Job

**ORDER  
TODAY**

ORDER RK-1  
ONLY  
**\$150**

### HOWARD W. SAMS & CO., INC.

Order from your Parts Jobber today, or  
write to Howard W. Sams & Co., Inc.,  
2203 East 46th St., Indianapolis 5, Ind.

My (check) (money order) for \$.....  
enclosed. Send.....copy(ies) of  
"AM-FM Servicing Short-Cuts" (\$1.50 ea.)

Name.....

Address.....

City.....Zone.....State.....

income should not exceed 40% if the business is to pay its owner a reasonable income and a small return on his investment.

As an example of the accuracy of these tables, a company that pays its field service technicians \$80.00 per week for a five day, eight hour-per-day week, must get five dollars per call if its technicians average 8 calls per day. This checks against actual operating costs that have been furnished to the Bureau by a number of service executives whose records are regularly checked by accountants. Most companies have difficulty maintaining this average of 8 calls-per-man-per-day.

In a one-man TV service operation it is difficult for the operator to average over four calls per day. On an average of 4 calls per day and working a five day week it would be necessary for the technician to get ten dollars per call in order to earn for himself an \$80.00 per week take home pay. Of course, most men who operate independently do not observe an eight-hour per day, five days a week schedule. Where they charge \$2.50 per call they must complete 80 service jobs per week to make \$80.00 per week "take home" pay for themselves. Those who charge \$3.50 per call have to handle 65 service jobs per week to earn the eighty dollars a week for themselves.

### Standard TV Labor Charges

The standard TV labor charges that have been made available to readers of this department have helped hundreds of small service business operators to up-grade their charges for services to a more realistic level. Obviously, very few service businesses can afford to hire cost accountants to help them figure their costs of operation. In a small shop, where one man must spread his attention over many things, it is often difficult to stay with one major service job until it is completed. More often than not, sets pulled to the shop for service are checked and repaired on a piecemeal basis. The standard TV labor charges charts provide a yardstick to measure what the charges for any type of service job should be when handled by an efficient service business.

The newer chart makes it easier to figure estimates. It also provides flat rate schedules for circuit checking with very nominal charges for the actual time it takes to remove and replace components. The new chart is called form TVL#2. The original chart is known as form TVL#1. Both of these charts are available printed on bristol board 11 x 14, suitable for use under glass or as wall charts. Both charts may be obtained by mailing \$1.00 to TTLB, P. O. Box 1321, Indianapolis 6, Indiana, and asking for wall charts TVL#1 and TVL#2.

### Color TV Progress

Most everyone in the industry expects the FCC to approve the stand-

ards for compatible color television recommended by the NTSC (National Television System Committee) before the end of this year.

Recently the NTSC delivered technical documents weighing fifty-two pounds and two ounces, to the Federal Communications Commission in support of its request for adoption of its proposed standards for a compatible color television system. FCC approval will probably usher in a mad race among manufacturers to produce all of the equipment that will be required for the completion of color TV sets. However, industry leaders have predicted that only a small percentage of television set production will be in color receivers next year. Production is not expected to exceed one per-cent of the total set production in 1954 at prices considerably higher than comparable black and white sets. Some estimates have ranged from \$800 to \$1000 for a color set with a 14-inch picture tube.

The sixty-four dollar question among manufacturers, set distributors, and dealers is whether the public will "sit it out" with their old sets waiting to buy color sets when they are available at nominal prices. Even those dealers who are most optimistic about the continuing market for monochrome sets despite the imminence of color realize they have a tough selling job ahead of them that will get even tougher as larger segments of the set owning public get to see color receivers in operation. Many dealers are jittery about the sale of monochrome sets taking a sharp nosedive right after the holidays and staying there until growing production of color receivers breaks the buying drouth.

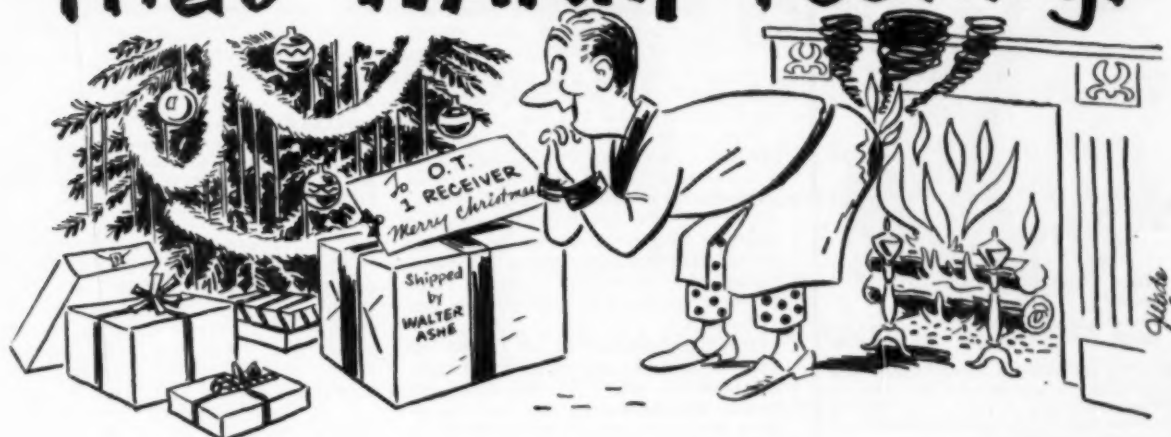
### We're in a Buyers' Market

For the first time in many years manufacturers of tubes and components find themselves deep in a buyers' market. The long-time boom, that absorbed manufactured items almost faster than they could be produced dulled the selling effectiveness of many organizations. Now they are all faced with the necessity of sharpening up their sales and sales promotional programs in trying to retain their places in a market where they are trying to shove more products than it normally could absorb.

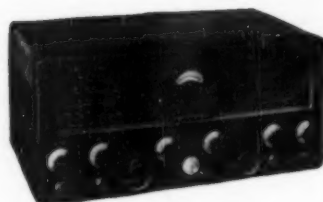
The economic situation now shaping up in the industry will give the independent service industry its greatest opportunity during the next two years to establish service as a stable, respected, and profitable segment of the electronics industry.

If set owners generally "sit tight" with their present TV sets waiting for color receivers at a price they can afford, the demands for service will increase. More and more sets that go into their fourth and fifth years of operation will increase the volume of major service jobs required. All indications are toward a growing volume of service that will permit established businesses to entrench their operations

# That "WARM" Feeling!



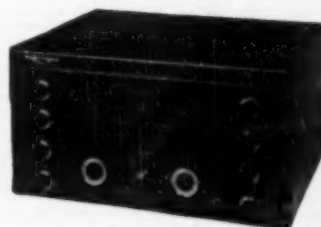
Nothing else equals the satisfaction you get from owning and operating the equipment of your choice—especially when Walter Ashe makes it so pleasantly money-saving with his fabulous "SURPRISE" Trade-In Allowance on used test or communication equipment. This year give yourself the best Xmas present ever. Trade used equipment now. Wire, write, phone or use the handy coupon below.



**HALLICRAFTERS SX-71.**  
Less speaker. Net \$249.95

**HALLICRAFTERS S-76.**  
Less speaker. Net \$199.95

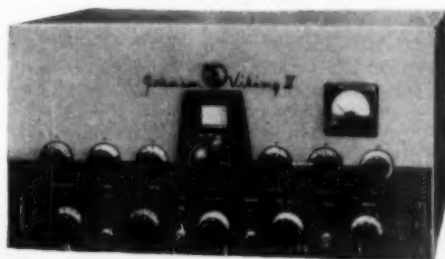
**HALLICRAFTERS S-40B**  
Built-in speaker. Net \$129.95



**NATIONAL NC-183D.**  
Less speaker. Net \$383.50

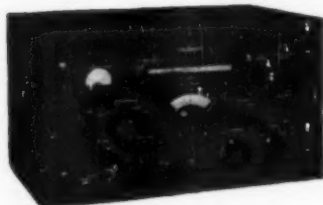
**NATIONAL HRO-60.**  
Less speaker. Net \$533.50

**NATIONAL NC-88.**  
Built-in speaker. Net \$129.95



**JOHNSON VIKING II TRANSMITTER KIT.**  
Net \$279.50

Wired and Tested. Net \$337.00



**COLLINS 75A-3**  
with 3 KC mechanical filter.  
Less speaker. Net \$530.00



**HAMMARLUND HQ-140X.**  
Less speaker. Net \$264.50

**All prices f.o.b. St. Louis**  
**Phone Chestnut 1125**

**Walter Ashe**  
**RADIO CO.**  
1125 PINE ST. • ST. LOUIS 1, MO.

December, 1953

----- **FREE CATALOG!** -----

WALTER ASHE RADIO COMPANY  
1125 Pine Street, St. Louis 1, Missouri  
☐ Rush "Surprise" Trade-In Offer on my \_\_\_\_\_  
for \_\_\_\_\_  
(show make and model number of new equipment desired)  
☐ Send new FREE 1954 Catalog.  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

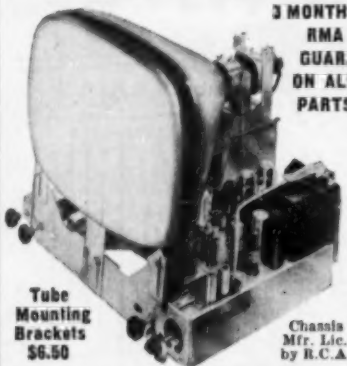
RH-12-53

**Send  
for  
your  
copy  
today**

## AIREX'S 1954 Co-Channel

**630 FA-2A** with Genuine FM  
Armstrong Sound System

**3 MONTHS  
RMA  
GUAR.  
ON ALL  
PARTS**



**Tube  
Mounting  
Brackets  
\$6.50**

Chassis  
Mfr. Lic.  
by R.C.A.

Here is the most powerful fringe area chassis on the market today... the one TV engineers and servicemen are buying for themselves. Clear, sharp, exceptional reception up to 200 miles.

### CHECK THESE EXCLUSIVE FEATURES

- 10 WATT push-pull audio output. Frequency range from 40 to 12,000 cycles • 3 position fringe area switch • Delayed gated AGC system • Standard Coil Cascade Tuner prevents radiation • Retrace Blanking Circuit allows you to raise the brightness without the annoying vertical retrace lines • Heavy duty front focus control • Automatic gain control potentiometer allows you to adjust the threshold sensitivity as low as 4 microvolts & still keep the full 4 MC band width • Improved sync amplifier • Improved automatic brightness control • Set aligned for 21.5 MC. New Ham band will not interfere • Improved fused high voltage power supply gives full 14.5 KV under load. Will handle all picture tubes up to 24 inch with full sweep • Improved video amplifier has a gain of 40 • All moulded plastic condensers give long life & trouble-free operation • Easily adapted to new UHF stations in 2 minutes by just changing a strip in the tuner • Extra heavy duty power transformer with large safety factor • 6CB tubes in Video IF to give full gain • Extra filtering in power supply for hum & ripple-free operation • Phone Connection & switch on chassis allows you to play your phonograph or tuner through the built-in 10 watt hi-fidelity amplifier • Extra heavy duty focus coil, which runs cool • Full focus cosine yoke.

**THE ONLY CHASSIS WITH 10 WATT  
PUSH-PULL AUDIO OUTPUT AT**

**\$169<sup>95</sup>**

Fed. Tax  
Included

Less C.R. Tube  
and Brackets

Complete with 12" ROLA Hi-Fi Speaker  
With UHF Converter—\$211.90  
Detailed Service Manual & Schematic—\$1

### TV PICTURE TUBE SALE

Standard Brands, Factory  
New, Guar. 1 year

- 17" Tube.....\$37.95
- 20" Tube.....\$34.95
- 21" Tube.....\$39.95
- 24" Tube  
(Guar. 3 Mos.).....\$79.95
- 27" Tube.....\$79.95
- Ring and Sleeve  
for 24".....\$ 7.50

**630 CHASSIS  
FOR 24" & 27" RECT.  
OPERATION  
PRICE.....\$229.95**

### TV GOLD PLASTIC MASKS

- 16" and 17".....\$ 4.95
- 20" and 21".....\$ 7.95
- 24".....\$14.95
- UHF SLUGS—\$7.95

### BARGAIN CABINET BUY

Beautiful mahogany console Cabinet cut  
for 630 FA-2A Chassis. Complete with  
mask, glass & tube mounting brackets.  
In Blend.....\$59.95

Send for complete cabinet brochure

### FREE—New TV—HI-FI PARTS CATALOG

All merchandise brand new, factory fresh, guaranteed.  
Mail & phone orders filled upon receipt of certified  
check or money order for \$25 as deposit on TV chassis.  
\$200 on other items. Balance C.O.D., F.O.B.  
N. Y. Prices & specifications subject to change without  
notice. NO FED. TAXES TO PAY.

## AIREX RADIO CORP.

SHOWROOM: 171 Washington St., N. Y. 7  
Gramercy 7-6245  
MAIL ORDER: 400 Lafayette St., N. Y. 3

and prepare for the real boom that will occur when color receivers become available in volume.

The bottleneck in the large scale production of color sets will be picture tubes. However, the electronic manufacturing industry has pulled production rabbits out of a hat time after time since TV was first launched commercially in 1946 and they will work this problem out too.

But the greatest boom the industry has yet experienced is expected to develop when color receivers become available at a price the average consumer can afford to pay. There is no question that every one of the present twenty-four million owners of monochrome sets will want to own a color TV receiver as soon as they see one in operation.

The big question is, of course—to what extent will the independent service industry share in the color TV boom? The answer to that rests largely in the hands of the people who are now operating successful service businesses. If they continue to work along as rugged individualists, take no interest in cooperating with their fellow service businessmen in programs for their common good, or fail to cooperate in programs designed to bring industry recognition of the importance of service as a vital factor of the electronics business—then the opportunities of the next year will be lost and the color TV boom will find independent service shoved back again to an insignificant position in the industry's spectrum.

—50—

## Certified Record Revue

(Continued from page 70)

thoven 5th symphony records you're likely to hear for a long time. None of the previous versions can hold a candle to these discs, but between the Mercury and the Victor, there is also a difference. For sheer sound, the Dorati version wins the potted palm. The Toscanini disc is a good clean recording, but suffers from a dry, non-resonant type of acoustical environment. Dynamic and frequency range is somewhat restricted. The Mercury disc has its familiar big hall liveness, incisive strings, and bright brass. It also has what has long been missing from all recordings of Beethoven's 5th: great dynamic range and superb transient response. The orchestration of this symphony demands that these two conditions exist. This is the first time I have heard the Beethoven 5th with the score completely articulate and cleanly delineated. Musically, we have the formidable Toscanini to deal with. No doubt about it. The Maestro knows his Beethoven. His reading is tremendously powerful, hugely conceived. He drives his orchestra at a furious pace, becomes almost frenetic. In fact this pace has made Toscanini the target of much criticism. Dorati has a much more leisurely conception of the score, and while he may not

have lived with the 5th symphony as long as the Maestro, he knows his way around the complexities and the pitfalls and his reading leaves little to quibble about. Both recordings have nice quiet surfaces, and follow their prescribed equalization, with the Victor disc requiring a slight boost in bass and treble.

### VERDI

#### OTELLO

NBC Symphony Orchestra conducted by Arturo Toscanini with soloists, and chorus. Victor LM 6107 (three 12" LP) Orthophonic curve. Price \$17.16.

I don't know how many of my readers like opera, but as a musically literate group there's bound to be enough of you to warrant an occasional foray into this field. In this recording of "Otello," there is enough sound and fury and good musical drama to break down even the most hidebound opera-hater. This is really one of the outstanding opera recordings in many a year. From the very opening bars, the music hits you with tremendous impact, and as the violent drama unfolds, you sit enthralled by the consummate artistry of Toscanini. For this recording is the quintessence of Toscanini. His is the driving, almost elemental force that makes this performance a monument to his conducting. I have never been one of that group of sycophants to whom Toscanini is almost god-like. I admire and respect the old man, but I am not so blinded by his virtues that I can't see his faults. There have been many times when one of his performances has been called great, but which in less emotional analysis was merely competent. Not so here. This is great, as shown by his subtlety of phrasing, his sure deft handling of large tonal masses, the iron control he exercises over all the forces at his command. The orchestra and the chorus are at their best here, with great precision being coupled with sumptuousness of tone. The two faults in an otherwise wonderful recording are the somewhat inadequate soloists, and the sound itself. This disc was made from air checks of the famous broadcast in 1947 and is about what you would expect from that period. Not at all wide range, or distortion-free, but nevertheless acceptable by reason of the great music. I had to search around a bit for a proper curve to reproduce this satisfactorily. An 800-cycle bass turnover with a 6 db roll-off in the high end seemed best suited. Surfaces were moderately quiet.

### COPLAND

#### THIRD SYMPHONY

Minneapolis Symphony Orchestra conducted by Antal Dorati. Mercury "Olympian Series" MG 50018. AES curve. Price \$5.95.

This will probably go down in history as one of the finest lease-breakers ever devised! I have seen a great many extravagant claims by manufacturers of discs lately, in which they tout one of their recordings as "the

highest fidelity ever made, etc." You know, after a while this sort of thing gets to be a little ridiculous. What are they trying to prove? Anybody who wants to can stick a mike right down inside every instrument and come up with some pretty fantastic sounds. The only trouble is, it isn't music. Mercury makes no claims about this disc being the most ultra-stuff, or super-something. They don't have to. If you play this disc as per Mercury's suggestion, at full room volume, it will advertise itself in no uncertain terms. This is just about the most fantastically accurate representation of the original musical performance I have ever heard from a phonograph record. Strong words? You bet! When you hear the section in the last movement known as the "Fanfare," I'm sure you'll agree. Absolutely tremendous bass drum and tympani, the bright blare of massed trumpets, huge cymbal and gong crashes! With a big speaker system those bass drum blasts hit you like a low blow to the stomach. And yet, there is no loss of proper musical balance or perspective. That is the crux of the matter. This isn't phony sound for trick effects. When you listen to the recording as a whole and pay attention to the dynamics involved, you realize those huge sounds are properly represented. And mind you, this is still done via the single-Telefunken and Miller cutter routine. I stress this because so many outfits are trying to pull rabbits out of the hat with trick sounds designed to bowl you over. This is a very unhealthy trend, as unhealthy as these set manufacturers calling everything they make, "high fidelity." I think I stated in my very first column, that we should not forget, in our quest for "perfect sound," that we are still dealing with music and must, perforce, stay within the bounds of good taste. I certainly have no objection to exciting sounds as long as musical values are preserved. Musically, Copland's Third Symphony can probably be gauged his most important work. Many parts of the writing remind you of his "Appalachian Spring" and "Billy the Kid." A work of great contrasts, it can be alternately soft, almost pastoral in nature and swiftly change to dance rhythms with more than a hint of jazz figurings, and then to the thundering perorations of the "Fanfare" and the finale. It goes without saying that this disc will be used for hi-fi demonstration purposes. The happy thing about this fact is that this is wonderful, brilliant and interesting music. We won't have to endure some dreadful cacaphony just for the sake of some "super-sound." I understand Dorati's performance has the blessing of the composer himself, in this first recording of the work. I've never heard a "live" performance of this work, but Dorati certainly seems to be authoritatively at home with the complex score, and the playing he elicits from the Minneapolis is magnificent. In fact, with this recording,

December, 1953

# MAKE MORE MONEY ON SERVICE!

## TELEVISION • RADIO • ELECTRONIC



Learn to handle ANY job easier, better and lots FASTER this modern professional way!

**ONLY \$12 FOR THE COMPLETE TRAINING You Save \$1.25**

Ask the men who already have good-pay jobs! They'll tell you that Ghirardi training is the finest—AT ANY PRICE—because it is so outstandingly complete, and because it makes even the toughest subjects so easy to understand.

Remember! For 20 years, Ghirardi radio-television training books were more widely used for home study, by schools and colleges, and for military radio training than any others of their kind.

Each of these two books is entirely new, completely modern in every respect—NOT a re-hash of old, outmoded material. Together, they form a complete service library written so you can easily understand every word—and designed to serve either as a complete training course or as a handy reference for experienced servicemen who want to look up puzzling jobs or develop new and faster methods.

### Radio and Television Receiver CIRCUITRY AND OPERATION

By Ghirardi and Johnson . . . 669 pages, 417 helpful illustrations

Years of experience plus hundreds of talks with service technicians proved to Mr. Ghirardi the need for a book that got right down to earth in explaining the basic circuits and operation of modern radio and television receivers. This book is the result. Backed by what you can learn from it, you'll find that 9 out of 10 service jobs are tremendously simplified. You'll work faster with less laborious testing—and make more money in the bargain! Guesswork is eliminated.

Starting with AM and FM processes and characteristics, the book progresses to a complete understanding of basic circuits, how they operate, how to recognize them quickly and what is likely to go wrong with them. By making it easy for you to understand each circuit and its relation to other circuits, the book helps you go right to the seat of trouble in far less time. You'll know what different trouble symptoms mean—and you'll know how to repair troubles lots faster and more efficiently.

Sold separately for \$6.50. Try it for 10 days on our FREE examination offer.

### Radio and Television Receiver TROUBLESHOOTING AND REPAIRS

By Ghirardi and Johnson . . . 822 pages, 417 clear illustrations

This big book makes the tough service jobs easy, makes the easy ones a cinch! Actually, Radio & Television Receiver TROUBLESHOOTING AND REPAIR is a complete guide to modern professional service methods.

First you get a full analysis of components, their functions, their troubles and their remedies. Next you learn modern trouble-shooting methods—from "static" tests to dynamic signal tracing and injection techniques. You learn basic procedures and how to interpret performance data. Four big chapters show how to realign Television, FM and AM receivers in less time. You'll learn how a glance at a TV set may quickly tell you what is wrong. Special hard-to-fix service problems are explained. Puzzling "intermittent" troubles and their remedies are clearly outlined. Step-by-step service procedure charts demonstrate many operations almost at a glance.

In short, from the simplest troubles to the most difficult ones, everything is carefully explained—and the entire book is fully indexed so you can find exactly what you want in a jiffy.

Read it 10 days FREE! See for yourself how this great book can pave your way for bigger pay. Sold separately for \$6.75. Save money by ordering the special combination offer!

**PRACTICE 10 DAYS FREE!**



Learn all about circuits—and watch service "headaches" disappear!



A complete training course in modern, professional service methods

## SPECIAL money-saving OFFER!

Save \$1.25 by ordering both of the above big books. Make your service library complete!

Dept. RM-123, Rinehart Books, Inc., Technical Division, 232 Madison Ave., New York 16, N. Y.

Send books checked below for 10-day FREE EXAMINATION. In 10 days, I will either remit price as indicated or return books postpaid and owe you nothing.

Check here to order books singly: ☐ Radio & TV Receiver CIRCUITRY & OPERATION (Price \$6.50 separately) ☐ Radio & TV Receiver TROUBLESHOOTING & REPAIR (Price \$6.75 separately)

☐ Check here for MONEY SAVING COMBINATION—Save \$1.25! Both of the above big books at the special price of only \$12.00 for the two. (Regular price \$12.75—you save \$1.25.) Payment at the rate of \$3 after 10 days if you should keep books and \$3 a month thereafter until the total of \$12 has been paid.

Name .....

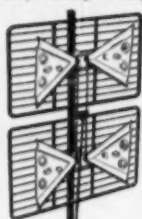
Address .....

City, Zone, State .....

OUTSIDE U.S.A.—\$7.25 for TROUBLESHOOTING & REPAIR book; \$7.00 for CIRCUITRY & OPERATION; \$13.00 for both books. Cash with order only. Money refunded if you return books in 10 days.

## Most Sensational Bargain

National Electronics Has Ever Offered  
Clear, Sharp Fringe Area Reception



ON ALL CHANNELS  
UHF and  
VHF

TV ANTENNA KIT  
Everything Needed  
For A Perfect  
Installation

**\$1995**

A complete hi-gain UHF-VHF antenna system designed for fringe usage with everything needed for the complete installation. Just think! A powerful fringe-type 2-bay 16-element conical and 2 hi-gain two-bay Bow-Tie Reflector for UHF—with complete mounting kit containing everything you need for installation. A terrific value!

Model UV-1... \$19.95  
Model UV-2... \$21.45  
Look at what you get with Model UV-1

Two-Bay UHF Bow-Tie Reflector, 2-bay 16-element Conical, 1 UHF-VHF antenna matching transformer, 75' UHF cable, 10' seamless

Only National Electronics Could Offer Such a Bargain  
UHF STRIPS—Now available for Standard Coil Tuners. To order specify channel No. and series designated by letter such as F, G, Q, etc., stamped on each strip of your present tuner. (Not complete of one, 6 ant.)

Save With Rocket 35 Foot Mast Kits

Economy mast kit contains 3 self-coupling 10' seamless TRI-COATED 1 1/2" O.D. masts, one 5' mast, 300 feet of 6/20 galvanized steel guy wire, and everything else needed including guy rings, insulators, cable clamps, guy hooks, and swivel mounting base.

35 foot Mast Kit \$19.95 25 foot Mast Kit \$19.95

ALL PRICES F.O.B. CLEVELAND, OHIO

Do not remit more than complete purchase price. Pay shipping charges on receipt of goods. 25% deposit on all C.O.D. orders, please. Money-back guarantee. Prices Subject to Change Without Notice

## Perfect Pictures in Fringe Areas Rocket Super Fringe All Channel Antenna

This truly sensational TV antenna is THE ANSWER to super-fringe area reception. Twenty-four driven elements provides a balanced all channel 20 db gain that produces astounding results at 100 or more miles from transmitter. Also provides crystal-clear UHF pictures in primary or near-fringe areas. We strongly recommend this powerful antenna as the "Finest All-Channel TV Antenna On The Market Today."

- 24 Anodized Aluminum Elements (guaranteed against staining or tarnishing)
- Solid Cast-Aluminum Back-up Blocks
- Plexi-glass Hi-dielectric Insulators
- Aluminum Washers and Stand-offs
- Cadmium-plated Nuts & Bolts
- 3/16" Dowel Pins
- Light Weight—No thread bearing required on installation

Series "J" \$24.95  
Lots of 3 \$23.35

- Size: 92" wide—80" high
- LOOK AT THESE AMAZING FEATURES
- Clear pictures up to 100 miles and more from station—plus UHF near-fringe reception
- 12 driven elements on high VHF!
- 12 driven elements on low band!
- High gain—low noise ratio!
- One transmission line!



## RADIATOR TELEROTOR

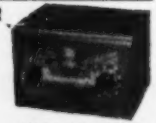
WITH DIRECTION INDICATOR

Streamlined, waterproof, sturdy, 12 heavy duty ball bearings. Heavily reinforced die-cast housing. Precision gears. Positive stop at end of rotation. Heavy duty motor reverses instantly. Mast, tower or platform mounting. Factory lubricated for life. Perfect pattern dial gives immediate indication of antenna position.

Conductor Wire \$ .08 ft. Requires 8 Cond. Cable

## UHF TELEVISION CONVERTER

Auto UHF television converter with built-in booster. Continuously variable for channels 14 thru 83. Built-in wide band VHF booster for channels 2 thru 13. Self-powered for 110 volt, 60 cycle AC operation. Selector switch gives choice of VHF or UHF antenna. VHF antenna may be fed thru the broad band booster or direct to the TV set. Stock No. 228, shipping weight 7 lbs.



**\$34.95**

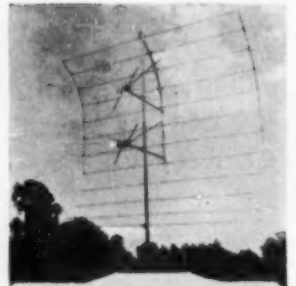
**National Electronics**  
OF CLEVELAND  
**THE HOUSE OF TV VALUES**  
112 Delco Building Cleveland 3, Ohio

# Fringe Beam

PRESENTS  
THE SENSATIONAL NEW  
VHF - UHF

## PARABORAY

- High average gain across entire TV spectrum (channels 2-83).
- Based on the radar parabolic-type antenna.
- Dipole of entirely new design that produces sharp pattern and high front-to-back ratio so desirable in the fringe area.



Model FB-P283, List \$39.50

1. No other antenna is necessary with the Parabray and only one transmission line is needed for VHF and UHF.
2. The outstanding performance of the Parabray will sell itself.
3. Light weight but ruggedly constructed to withstand the most adverse weather conditions.
4. Will give more performance per dollar than any other antenna on the market.
5. Clear picture in the 100-200 mile range.

An outstanding line for outstanding Representatives. Some territories still open. Write today!

**Neal Electronic Co., Inc.**

Huntsville, Alabama . . . P. O. Box 376

and other recent efforts, the Minneapolis Symphony must be reckoned with as one of the most potent top rank orchestras in the country. The AES curve reproduced the record without recourse to touch up on bass or treble. Surfaces were quiet. Everything considered, one of the top releases of the post-war era.

## BERLIOZ

### ROMEO AND JULIET

Boston Symphony Orchestra conducted by Charles Munch with chorus and soloists. Victor LM-6011 (two 12" LP) Orthophonic curve. Price \$11.44.

The advent of a complete version of this work is likely to cause some consternation among those who invested in the excerpted LP recently issued by Columbia. Well, that is LP for you! It's either feast or famine. This latest recording is one of Victor's best efforts with their new Orthophonic recording. A fine orchestral balance is matched by good acoustic treatment. The surprisingly good choral work is clean and articulate. Soloists are in proper perspective to the greater tonal masses. Victor advertises this disc as, "For Hi-Fi fans," on a little sticker applied to the front of the album. This is a good recording and I certainly recommend it to those interested in this work. But I don't think it need be called "Hi-Fi." The dynamic and frequency response still fall a little short of the efforts put forth by several other companies. Charles Munch, certainly one of the most controversial conductors of the Boston Symphony, is at his best here. Throughout the recording, the score bears witness to his painstaking efforts, in this highly polished performance. The orchestra is rich and sonorous and sympathetic to every demand made of it by the conductor. The recording followed the Orthophonic curve with a couple of db boost in the bass end adding an extra fillip. Quiet surfaces and the inclusion of a libretto complete the bonus picture.

## HANSON

### SYMPHONY #4

### HARRIS

### SYMPHONY #3

Eastman-Rochester Symphony Orchestra conducted by Howard Hanson. Mercury "Golden Lyre Series" MG 40004, AES curve. Price \$5.95.

This is the second recording of the Hanson 4th and a most welcome one. The previous effort by American Recording Society was but a miserable shadow of the stature of this work. One of the most lyrical of modern symphonies, Hanson wrote the work as sort of a Requiem Mass for his Father. Though an intensely personal and dramatic work, it is completely fascinating in its complex orchestration and never for a moment does it become maudlin. The sound is magnificent. Take a listen to the Dies Irae, which is actually the scherzo. Against the background of the main orchestration, mostly heavy brass and strings, listen to the infinitude of detail that you can hear. This is a test



# Learn to Use Instruments MORE EFFECTIVELY!



THE INSTRUMENT GUIDE WRITTEN ESPECIALLY FOR  
**Servicemen,  
Amateurs,  
Experimenters**

- ★ Learn new uses for old instruments
- ★ Learn to do better faster testing with fewer instruments
- ★ Avoid buying unnecessary instruments
- ★ Learn how to evaluate instrument readings and put them to practical use

## BASIC ELECTRONIC TEST INSTRUMENTS

by Rufus P. Turner  
254 pages, 171 illus.,  
Price \$4

How well you work—how fast you work, and how much money you make depends to a big extent on how much you know about instruments.

**BASIC ELECTRONIC TEST INSTRUMENTS** is a down-to-earth guide that can help you in dozens of ways—from showing new uses for old instruments to guiding your instrument purchases and avoiding costly types that aren't really necessary.

Over 60 types—from the latest TV pattern generators to special-purpose bridges, general-purpose instruments and all the old standbys—are clearly described. Valuable work-saving testing short cuts are outlined.

### SAVE MONEY... DO BETTER WORK!

In addition to all "standard" instruments from simple meters to capacitance checkers, oscillators, oscilloscopes and dozens more, you get complete training in the newer ones such as grid-dip oscillators, TV sweep and marker generators, TV linearity pattern generators, square-wave generators, distortion meters and many others.

You are shown new uses for VOM's, oscilloscopes, signal generators and other familiar types. You learn easy ways to extend the ranges of old instruments; how to make an accurate bridge from old instruments; how to use power drain measurements for fast TV troubleshooting; how to calculate shunts and multipliers; how to measure r-f impedance with a simple T-network; how to measure inductance and capacitance with a grid-dip oscillator—and scores of other money-saving tips.

Use coupon today!  
Read it 10 days AT  
OUR RISK!

**10-DAY  
FREE  
TRIAL**

Dept. RM-123, RINEHART BOOKS, Inc.,  
Technical Division, 232 Madison Ave.,  
New York 16, N. Y.

Send Turner's **BASIC ELECTRONIC TEST INSTRUMENTS** for 10-day FREE EXAMINATION. If I decide to keep book, I will then remit \$4.00 plus postage. Otherwise I will return book postpaid promptly and owe you nothing.

Name .....

Address .....

City, Zone, State .....

OUTSIDE U.S.A.—Price \$4.50, cash only. Money back if book is returned in 10 days.

of true balance in a recording and this one has it to spare. A very live recording, bright and clean in every section of the orchestra. Dr. Hanson leads an extremely good orchestra in a completely satisfying and authoritative performance of his work. Using the AES curve, no touch-up on bass or treble was required. Surfaces were even more quiet than usual. The Harris 3rd is an extremely interesting work and again falls into the category of a "modern" which makes for easy listening. Starting sonorously in the celli, the work expands on rather broad and expressive lines, with strings predominant. About half way through this one-movement symphony, the strings take up a dance-like figure and a fascinating fugal development takes place. First the trombones and trumpets state the theme, followed by horns and trumpets. After further development a quiet pastoral-like interlude has its brief moments and a re-statement of the opening theme occurs, and the symphony ends with heavy percussion in the bass drum, tympani, and cymbals. This one is a "sleeper." With the wonderful sound throughout all these sections, this could become one of the favorite demonstration records, even though the music will be unfamiliar to most. Dr. Hanson and the Eastman-Rochester Symphony with their brilliant performance of this work and previous efforts, must be considered as among the finest interpreters of "modern composition" since the Koussevitsky-

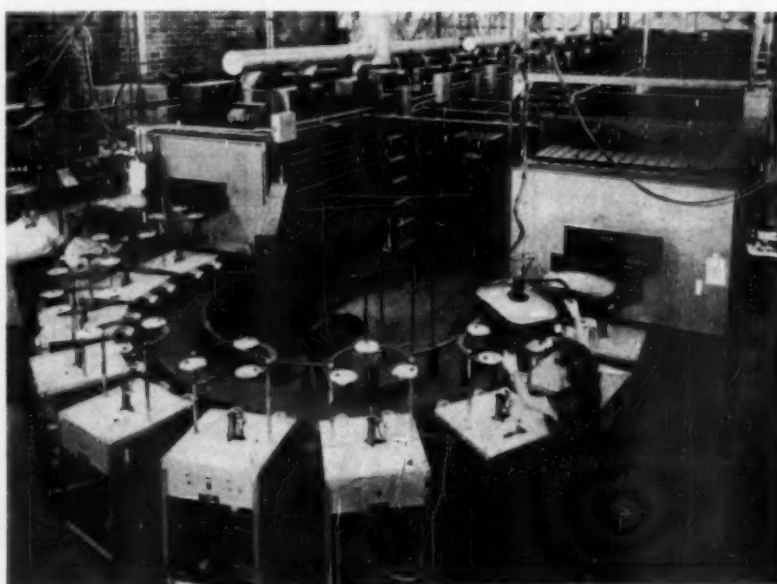
Boston Symphony era. The AES curve was adequate again and surfaces were quiet. (Thank goodness I've noticed a growing trend among the recording companies to follow their published curves more than has been usual.)

## BEETHOVEN SYMPHONY #6

NBC Symphony Orchestra conducted by Arturo Toscanini. Victor LM 1757, Orthophonic curve. Price \$5.72.

Still another warhorse from Victor, but as in the case of the Beethoven 5th, equally welcome. This is the thirteenth version on LP and by all odds the best. This work has always been one of Toscanini's particular dishes of tea and his performance here is superb. I find it superior even to his older version with the BBC orchestra, and that was a darned good one. In a score that demands subtlety and restraint be coupled with ultra-careful attention to tempo, Toscanini has met the challenge most successfully. His reading is a marvel of balance and integration. While the sound is not as opulent as the *Westminster*, *Capitol*, or *London* versions of this symphony, it is nonetheless highly acceptable. Strings and woodwinds are clean and good acoustic balance is maintained throughout. A deficiency in the bass end, responds to 4 db of boost. No, not sensational sound, but good enough that with the excellence of interpretation, it is the preferred recording. Typical quiet Victor surfaces.

Loading and unloading tubes at the end of the exhaust machine through which the tubes travel nearly 300 feet at the Raytheon plant. These tubes automatically receive the processing required during various parts of the exhaust cycle. One feature of this exhaust machine is that glass strains and bulb breakage are minimized since the long length of the machine allows ample temperature control and permits the tubes to emerge at a temperature only slightly above that of the room. This operation takes place at Raytheon's new 105,000 square foot picture tube plant which is now producing 21, 24, and 27 inch picture tubes. The plant contains the largest available bake-out oven as well as the largest screen settling and exhaust machines in the world.





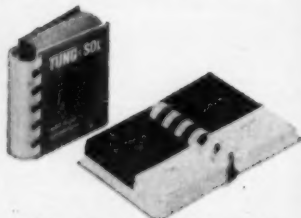
## TUNG-SOL TECHNICAL DATA BOOKS



**T-58**—Two volumes—nearly 700 pages of data on 600 types of tubes.



**T-70**—More than 160 pages of data.



**T-31**—More than 300 blue-print-type base diagrams for more than 1100 tube types.

When opened, all books lie flat for easy reference.

These handy, easy-to-use books contain all the information that set designers, equipment designers and service dealers need for everyday use. They are the most practical tube-reference books in the industry, with technical information and charts compiled for fast reading. Take the trouble out of electron tube trouble-shooting. Get TUNG-SOL Electron Tube Technical Data Books. Ask your distributor, salesman, or write to Tung Sol Electric Inc., Newark 4, N.J.

## TUNG-SOL ELECTRON TUBES

and all the technical help that goes with them.

### "The Purist" (Continued from page 56)

pedance vs frequency curve of a popular 15" speaker, selling in the \$100 price bracket, when mounted in a totally enclosed box (infinite baffle) of the same cubic content as "The Purist." Fig. 6 is the impedance curve of the same speaker when mounted in "The Purist". The speaker used for these tests had a free-cone resonance of 47 cycles and a cone mass of 85 grams. Note the reduction in the speaker resonant frequency to 34 cycles when mounted in "The Purist".

The resonant frequency of the speaker can only be reduced by: (1) Increasing the compliance of the speaker cone suspension; (2) Adding mass to the cone of the speaker in the form of cone material; and (3) Adding mass to the cone in the form of increased air loading.

Since no material is added to the cone nor the compliance of the speaker affected in any way except a stiffening due to coupling chamber capacitance, the reduction in resonance can only result from an increase in the air loading on the speaker cone. The amount of this increase can be calculated as follows:

$$M_e = F_{r,m}^2 \times M_c / (F_c^2 - F_{r,m}^2)$$

where:

$F_{r,m}$ —effective resonance of the cone with mass added (cps)

$M_c$ —mass of cone (grams)

$M_e$ —mass added (grams)

$F_c$ —free cone resonance of speaker (cps)

The air loading of a 15" speaker when mounted in an infinite baffle is approximately 22 grams. By the above relation, it is calculated that "The Purist" increases the air loading by 94 grams. This amounts to more than quadrupling the air load on the speaker in the 35 cps region. At higher frequencies the increase in air loading is even greater. This increased air loading reduces the motion of the speaker by a factor of 4 for the same amount of radiated acoustic power, thus reducing non-linear distortion. The impedance curves show how the peak of the curve due to the bass resonance of the speaker is lowered and broadened when the speaker is mounted in "The Purist." This amounts to lowering the "Q" of the tuned circuit and illustrates how the increased air loading increases the acoustic damping on the speaker cone. Transient response is preserved by the lack of any tuning devices and by the increased acoustic damping.

Fig. 5 gives the dimensions for "The Purist" for 12" and 15" speakers. Production models of this enclosure are made from 3/4" plywood and all joints are screwed and glued. It is strongly recommended that home constructors follow the same procedure to prevent rattles, vibrating panels, or loose baffles that might mar the transient

### MERIT PLATE TRANSFORMERS

1100 VCT/150MA	\$ 4.27
1320, 1100VCT/250MA, 40V Vias Tap	8.53
2140VCT/125MA; 1000VCT/150MA	10.58
1800, 1400VCT/225MA	10.14
2700, 2350VCT/300MA	25.28
4200, 3400VCT/300MA	32.34
5800, 4770VCT/300MA (Sq. Cts)	47.04

### MERIT FILAMENT TRANSFORMERS

2.5VCT/10AMP/10KV INS	\$ 3.82
5VCT/1AMP/2500V INS	2.45
5VCT/30AMP/2500V INS	7.05
6.3VCT/1AMP/2500V INS	1.76
6.3V/1.2AMP/5KV INS (TV REPL)	2.20
6.3VCT/3AMP; 6.3VCT/3AMP/2500V INS	4.20
5VCT/1AMP; 6.3VCT/1AMP/2500V INS	4.20
10VCT/10AMP/3KV INS	6.17
12.6VCT/2AMP/2500V INS	2.79
25.2VCT/1AMP/2500V INS	2.79
12.6V/7AMP or 25.2V/3.5AMP/2500V INS	6.17

### MERIT FILTER CHOKES

15HY/85MA/1500V INS	\$ 2.94
10HY/110MA/1500V INS	2.94
12HY/150MA/1500V INS	3.53
15HY/150MA/2KV INS	5.14
5HY/200MA/1500V INS	4.11
10HY/150MA	3.82
10HY/200MA	4.70
10HY/250MA	4.67
8HY/300MA	6.74

### MERIT UNIVERSAL MODULATION

PRI-2000-2000/50MA Per Side; SEC-2000-2000/50-100MA* 15 WATTS	\$ 6.76
PRI-2000-2000/150MA Per Side; SEC-2000-2000/150-300MA* 40 WATTS	9.85
PRI-2000-2000/220MA Per Side; SEC-2000-2000/220-440* 125 WATTS	13.23

\*SERIES—PARALLEL

### ALUMINUM CHASSIS

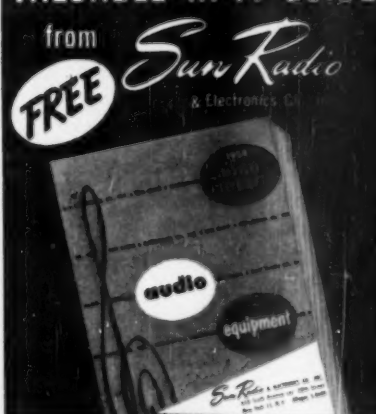
5 1/2"x9"x1 1/2"	\$ .88	7x15x3	\$1.80
4x17x3	1.53	7x17x3	1.91
5x10x3	1.05	8x17x3	2.03
4x14x3	1.45	10x12x3	1.45
7x7x2	.91	10x14x3	2.10
7x9x2	.90	10x17x3	2.28
7x11x2	1.00	11x17x3	2.29
7x13x2	1.20	12x17x3	2.67

All prices f.o.b. warehouse New York

**LEEDS RADIO CO.**

75 West 57th St. Dept. A New York City 19

## VALUABLE HI-FI GUIDE



Complete, authoritative High Fidelity Audio Book containing pictures and facts on outstanding phono equipment, tape recorders, radio tuners, audio amplifiers, loudspeakers, cabinets and TV. Large selection of complete HI-FI Systems ranging from \$95.00 up.

Please rush my FREE Audio Book.  
SUN RADIO—Dept. LT  
650 Sixth Avenue, New York 11, N. Y.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

RADIO & TELEVISION NEWS

response of the enclosure. Access to the speaker chamber may be obtained by making the top slide towards the back of the enclosure in a tongue-and-groove arrangement. It is important that the top make an airtight seal. Home constructors are especially cautioned to make the speaker cavity air tight. Failure to do so results in poor coupling between the speaker and the throat of the horn which gives a porting effect on the coupling chamber. A port of this type gives rise to a peak in the response curve and mars the transient response of the enclosure.

Since speakers vary in their cone mass, compliance, and resonant frequency, padding of the speaker cavity is usually necessary to give optimum results with any given speaker. The amount of padding necessary must be determined by a listening test with the individual speaker. A general rule of thumb is that lightweight coned speakers need more padding than the heavier coned types. Some padding is necessary on the inside surfaces of the side panels to avoid standing waves.

The ultimate test of any musical instrument or reproducer is the listening test as it is here that many theoretically ideal designs fail to live up to their expectations. During A-B test comparisons with vented enclosures may appear to have more bass than "The Purist". A few moments of careful attention, however, reveal the "Johnny One Note" characteristic of the vented enclosure in contrast to the true bass response of "The Purist."

(Note: This article covers material on which the authors have patents pending and on which it is the authors' intention to file for basic patents. Publication of this material does not give or imply any right or license under patents pending or to be filed.

#### REFERENCES

Gately, E. J.: "Design for Better Bass," *Audio Engineering*, October 1952.  
Olsen, H. F.: "Elements of Acoustical Engineering," D. Van Nostrand Co., Inc.  
Olsen, H. F.: "Cabinets for High-Quality Direct Radiator Loudspeakers," *RADIO & TELEVISION NEWS*, May 1951.

#### FISHING BY SONAR

A NEW approach to foolproof commercial fishing was introduced recently by the Minneapolis Honeywell marine equipment division. Using a transceiver working in the ultrasonic sound wave range, a transducer, and a radar-type indicator, this system, when installed in a commercial fishing vessel, allows fishermen to detect schools of fish.

Sonar, as used by the Navy, can detect the presence of mines, submarines, and similar objects. The "Sea Scanar," as the new development is called, working in a different frequency range, however, is so sensitive that it can detect fish.

In operation, the transducer, which is located in a soundome projecting a few inches below the hull of the vessel, sends out a narrow beam of sound waves. If the waves strike an object, an echo returns, is picked up by the transducer, fed to the transceiver, and then to the indicator. The screen of the indicator is normally dark and shows up objects as light pips.

December, 1953



**obviously outstanding**

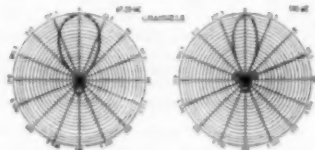
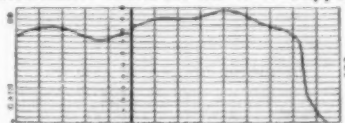
the **W-W** **CLIPPER**  
VHF all channel antenna

Not Just Claims But Unquestioned Proof Of

- **PERFORMANCE** — an engineering accomplishment providing an outstanding antenna designed for increased sensitivity and higher gain in both primary and fringe areas.
- **ACCEPTANCE** — a phenomenal customer acceptance resulting from WW's superb performance characteristics — thousands in use throughout the U.S.
- **SALES** — performance, design, workmanship . . . outstanding selling points to create unprecedented sales demand. Get your share now!

Specifically engineered and designed for true and complete all-channel VHF reception.

Performance charts for the W-W Clipper



#### CHECK THESE FEATURES

High Uniform Gain — One Major Forward Lobe — Narrow Beam Reduces Ghosts and Noise Pickup — High Signal to Noise Ratio — Good Front-to-Back Ratio Eliminates Co-Channel Interference — Perfect 300 Ohm Match — Light, Rigid, Quickly and Easily Installed to All Heights — Low Wind Resistance.

#### ALSO MANUFACTURERS OF

Models 10 and 20 UHF Fans — Models 30 & 40 Colinear Fans — Model UH 6 element UHF Yagi — Model HT High Band VHF Antenna — K series Original Hairpin, Combination Yagi Antenna.

**Wells and Winegard**  
television accessory mfgs.  
DEPT. RTN BURLINGTON, IOWA



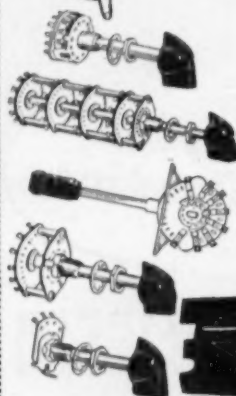
## I've switched to **ERIE** **SWITCHES** *They're in the BAG!*



The new, full line of ERIE rotary selector and lever switches includes twenty-five item numbers. They are made in four styles, in single or multiple sections, shorting and non-shorting types. ERIE switches meet existing R.E.T.M.A. requirements. For protection against the corrosion of heavy silver plated contacts, each switch is sealed in a durable plastic bag and then boxed for convenient stocking.

Descriptive literature is available at your distributors, or write Dept. B for your copy.

ERIE components are stocked by leading electronic distributors everywhere.



**ERIE**  
RESISTOR CORP.

ELECTRONICS DISTRIBUTOR DIVISION

**ERIE RESISTOR CORPORATION**

NEW YORK, N.Y. • ERIE, PA. • LONDON, ENGLAND • TORONTO, CANADA

## Check! these N.J.R.T. TUBE prices 70% to 90% off list . . .

Type	Price	Type	Price	Type	Price
1A7GT	.45	6AQ5	.37	6SK7GT	.39
1B3GT	.47	6AQ6	.35	6SL7GT	.46
1N5GT	.38	6AT6	.35	6SN7GT	.50
1L4	.44	6AU4GT	.69	6S07GT	.35
1L6	.41	6AU6	.36	6T8	.54
1LCS	.49	6AV6	.35	6U8	.59
1LNS	.49	6AX4GT	.57	6V6GT	.37
1N5GT	.44	6BA6	.41	6W4GT	.42
1R5	.43	6BA7	.37	6W6GT	.45
1S8	.37	6BC5	.42	6X4	.35
1T4	.43	6BD6	.45	6X5GT	.35
1U4	.43	6BE6	.37	7F8	.63
1U8	.37	6BG6Q	.92	12AL5	.40
1X2	.52	6BH6	.44	12AT6	.35
3A4	.43	6BJ6	.41	12AT7	.54
3Q4	.46	6BK7	.65	12AU6	.38
3Q5GT	.47	6BL7GT	.60	12AU7	.41
3S4	.44	6BQ6GT	.57	12AV6	.50
3V4	.45	6BQ7	.60	12AV7	.57
5A24	.59	6BZ7	.89	12AX4GT	.46
5U4	.46	6C4	.39	12AX7	.49
5Y3GT	.30	6CB6	.42	12BA6	.36
5Y4G	.33	6CD6Q	1.09	12BA7	.44
5Z3	.37	6FG6	.37	12BE6	.37
6A3	.57	6F6GT	.35	12BH7	.65
6A6	.49	6J5GT	.40	12SA7GT	.42
6AB4	.42	6J6	.50	12SK7GT	.46
6AF4	1.06	6K6GT	.35	12SN7GT	.50
6AF6	.78	6L6	.62	12SQ7GT	.42
6AG6	.41	6S4	.37	12SR7MET	.47
6AJ5	.68	6S6GT	.51	12V6GT	.60
6AK5	.73	6SA7GT	.41	19BG6Q	.95
6AL5	.36	6SD7GT	.39	19T8	.77

### Guarantee

ALL N.J.R.T. TUBES  
ARE BRAND NEW  
AND FULLY GUARANTEED FOR 1  
YEAR

Type	Price
25BQ6GT	.60
25LEGT	.37
25W4GT	.45
25Z6GT	.35
35A5	.50
35B5	.38
35C5	.37
35L6GT	.40
35W4	.35
35Z3	.43
35Z5GT	.35
42	.40
43	.53
45	.59
50B5	.37
50C5	.37
50LEGT	.39
70L7GT	1.07
76	.42
117Z3	.35
807	.97

T.V. PIX TUBE  
BRIGHTNER ..... \$1.59  
LOTS OF 10 ..... \$1.49

**Free 50**

assorted condensers with  
each \$25.00 tube order.

For T.V. sets where voltage supply  
is low AC LINE BOOSTER  
with safety fuse and switch \$5.95

Many 7 volt types not listed. All tubes individually boxed. Minimum order \$10.00. Tubes offered subject to prior sale. Prices subject to change. Orders shipped prepaid if check is enclosed. 25% deposit required on c.o.d. shipments.

SEND FOR FREE TUBE LISTING



**NEW JERSEY TELEVISION SUPPLY CO.**

906B WESTFIELD AVE., ELIZABETH, N. J. EL 3-6166

## TV Low-Voltage Supplies (Continued from page 60)

other one, tied to the -135 volt supply point, is used to supply those stages whose cathodes are operated at from -50 to -150 volts. The heater circuits are otherwise straightforward, with inductor-condenser decoupling networks for the heaters of the tuner and input i.f. stages.

### Servicing Power Supplies

There is no question that the power supply must be operating properly if the other stages are to do likewise. As an example, consider the fact that the impedance of the power supply is an important factor involved in the proper operation of critical stages, such as the video detector and video amplifiers. An aging electrolytic in the power supply has reduced capacitance and thus increases the impedance of the supply. As a direct result of these stages working into an improper load, video smears and poor definition are likely to result. This is one example of a trouble that does not look as though it were caused by a defective component in the power supply—but was.

Many of the bypass condensers in the receiver are part of the multiple section electrolytics that are physically located in the vicinity of the power supply. Don't overlook the possibility that excessive heating of these condensers may introduce troubles into the circuits to which they are connected.

In one case, a number of symptoms indicated that the "B+" voltage was too low. Upon checking d.c. output voltage of the filter this was confirmed. The voltage dividers, rectifiers, filter condensers, and the choke were checked—all were good. The line voltage was checked and found to be normal. Then, the secondary a.c. voltages were measured and found to be too low. Therefore, the transformer was checked, but it was good. Even a bridge measurement was made to determine if any turns were shorted—all to no avail. The actual trouble proved to be a defect in the vertical output stage that caused the 6K6 beam-power tube to draw excessive current, and thus cause the transformer to saturate. In this saturated state the power transformer secondary had low inductance and, therefore, the induced secondary voltage was much too low. All power stages, such as the audio, vertical, and horizontal output circuits, are frequent sources of trouble because their tubes draw close to half of the total d.c. current drain, and they are often worked very hard.

In certain types of tuners, many instances were found where there was no high-channel reception. The low channels were fine. Naturally, it was assumed that tuner trouble existed. However, the tubes checked out all right on a tester, and new tubes from stock were tried out to make sure. The trouble proved to be in the power sup-

**RADIO & TELEVISION NEWS**

famous

# Telrex 4-BAY "CONICAL-V-BEAMS"®

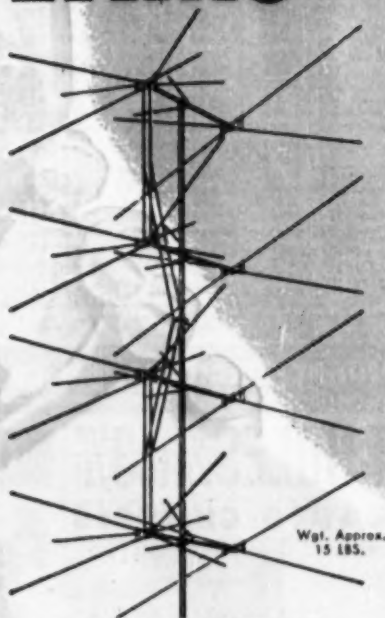
**—the acknowledged  
champion in 1948 and  
STILL CHAMPION!**

Install genuine Telrex "Conical-V-Beams," the Patented uni-directional, one transmission line array. Models for Ch. 2 to 13 or Ch. 2 to 83. See and hear the difference!

If UHF is available or expected, install Telrex "Duo-Band Conical-V-Beam" series. The perfect for rotation hi-gain... hi-F-to-B all-band one transmission line array with automatic transition from low to hi band with no lossy "distribution" pads.

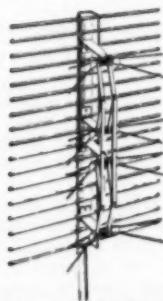
"Conical-V-Beams" are designed for easy stacking as required for your particular reception area. 1 bay "C-V-B" for pri-area, 2 bay "C-V-B" for sec-area, 4 bay "C-V-B" for fringe areas... If a 4 bay "C-V-B" does not provide a usable TV picture, TV reception is either impossible or impractical!

Broadbanded single channel highest gain hi-F-to-B yagis also available from Telrex Antenna Headquarters builders of world renowned communication yagis for amateur or commercial use.



**CHAMPION-FOR-DISTANCE  
MODEL 8X-TV\***

The Ultimate in long distance arrays. Guaranteed to out-perform any antenna or combination of cut-in-frequency antennas. When used with Duo-Band splines it comprises the ultimate from Ch. 2 to 83. Unequaled for reception up to 200 miles.

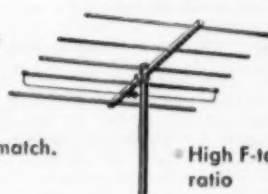


**ULTRA-HI GAIN UHF  
"CONICAL-V-BEAM" MODEL 84**

- Four bay uni-directional array
- All in-phase signal addition at all frequencies with no lobe splitting
- All-aluminum light weight and rugged

**PRE-ASSEMBLED, PRECISION TUNED  
5-ELEMENT YAGI**

- High gain, broad-band response
- Excellent 300 ohm impedance match.



• High F-to-B ratio

**WRITE FOR  
COMPLETE TELREX  
BULLETINS, TODAY!**

**Telrex INC.** BETTER BY DESIGN  
"CONICAL-V-BEAMS"

\*PATENTED  
ASBURY PARK 7,  
NEW JERSEY

**Insist on a genuine "Conical-V-Beam." Look for the Telrex Trade-Mark!**



Newest



Just Out



# AMAZING OFFER IN TV MANUALS

## A FULL YEAR'S TV MATERIAL IN A GIANT BOOK — \$3

### NEW SPECIAL OFFER

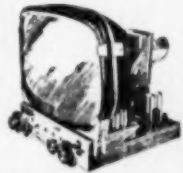
All Supreme mammoth television service manuals are now available to you at only \$3 and \$2 each. For only \$20, full price, you can have all TV manuals covering every important TV set made. This is an amazing bargain and defies all competition. Each manual is a virtual treatise on practical TV repair and should sell for at least twice its low price. Supreme gives better values because of tremendous volume sales.

### RADIO DIAGRAMS

Here is your complete source of all needed RADIO diagrams and service data. Covers everything from most recent radios to pre-war old-timers; home radios, auto sets, combinations, changers, and portables. Sensational values. Still sold at pre-Korean prices. Only \$2 for most volumes. Every Radio manual contains large schematics, all needed alignment facts, parts lists, voltage values, trimmers, dial stringing, and helpful service hints. All volumes are large in size, 8 1/2 x 11 inches, about 192 pages. See coupon below for a complete list of these low-priced manuals.

### COVER ALL POPULAR TV SETS

Supreme TV manuals cover all needed service material on every popular TV set of every important manufacturer. Here is helpful, practical, factory-prepared data that will really make TV servicing and adjustment easy for you. Benefit and save with these amazing values in service manuals. Supreme giant TV manuals have complete circuits, alignment facts, test patterns, response curves, service hints, recommended changes, voltage charts, waveforms, and many double-page diagram blueprints. Here is your TV service material to help you do more expert work quicker; and priced at only \$3 and \$2 per manual covering a full year of material. Be ready to repair any TV set by having in your shop all seven TV volumes listed in coupon. The new 1953 UHF Converters manual at only \$1.50 has everything you need on UHF. Separate Radio manuals described at left. Write us today. Immediate shipment. Order for a 10-day trial.



The repair of any television receiver is made easy with Supreme TV servicing manuals. Every set is covered in a practical manner that will simplify troubleshooting and repair. This is the help you need to find toughest faults in a jiffy. Each \$3 TV volume covers a whole year of TV service material. New UHF TV manual at only \$1.50 has everything on UHF. Be wise, buy Supreme Manuals only once each year instead of spending dollars every week for not needed data.

## RADIO-ELECTRONICS

### NEW AMAZING HOME-STUDY COURSE OFFER



Here is the most amazing bargain in electronic training. For only \$3.95 (full price), you receive a complete course of 53 large lessons. Covers every topic of radio, electronics, with large lessons on TV, FM, audio, etc. As an extra, every page has teacher-comments to guide you and supply additional help. Includes self-testing questions, 427 drawings, pictures, and diagrams. Compares lesson-by-lesson with the best \$200 home-study correspondence courses. Special price 3-in-1 volume, complete, 53 lessons, only

**\$3.95**

**Supreme Publications**  
Sold by all Leading Radio Jobbers

### NO-RISK TRIAL ORDER COUPON

SUPREME PUBLICATIONS, 1760 Balsam Rd., Highland Park, ILL.

#### Radio Diagram Manuals

- ☐ New 1953 Manual, \$2.50
- ☐ 1952 Radio
- ☐ 1951 Diagrams
- ☐ 1950 Manual
- ☐ 1949 Radio
- ☐ 1948
- ☐ 1947
- ☐ 1946
- ☐ 1945
- ☐ 1944
- ☐ 1943
- ☐ 1939
- ☐ 1936-1938 Manual, \$2.50

EACH  
\$2.50  
PRICED AT ONLY \$2 EACH

Send TV and Radio manuals checked ☐ below and at left. Satisfaction guaranteed or your money back.

- ☐ 1953 TV Manual, \$3.
- ☐ 1952 Television Manual, \$3.
- ☐ 1950 Television Manual, \$3.
- ☐ 1948 TV, \$3.
- ☐ Practical Radio & Electronics Course, \$3.95
- ☐ 1953 UHF Units, \$1.50
- ☐ 1951 TV, \$3.
- ☐ 1949 TV, \$3.
- ☐ 1947 TV & FM, only \$2.
- ☐ I am enclosing \$..... Send postpaid.
- ☐ Send C.O.D. I am enclosing \$..... deposit.

Name: \_\_\_\_\_ Address: \_\_\_\_\_

## ORDER BY MAIL FROM WHOLESALE RADIO PARTS CO., Inc.

### Equal To \$75 Motorized TV Aerial Systems 360° SUPER DIRECTRONIC

Electronically Rotates in All Directions VHF-UHF Ch. 2 to 83  
Exclusive Snyder Engineering and design cuts costs to **\$2495**  
Powerful, 24 element 3 bay Di-electronic antenna is electronically beamed to any transmitter in fringe area by 4-position selector sw. No motors or electricity. Extremely high gain. COMPLETE WITH 4-POSITION DIRECTRONIC BEAM SELECTOR, 100' TUBULAR TRI-X CABLE, UNIVERSAL U CLAMPS. Order Snyder model AX-524.  
A RAY SUPER DIRECTRONIC For ultra fringe. **\$44.95**  
Model AX-548



### PRECISE 300 K 7" SCOPE KIT

Sensitivity—Less than 10 mv. Has true electronic sweep magnifier. Attenuation control. Push-pull vertical from input thru output. push-pull horizontal. Internal blanking and 2 modulation with "banking" amplifier. Driven and non-driven sweep. Over 5 MC flat response (3 db) DC amplifiers. Cathode follower input on vert. and horiz. Internal calibrator. Horiz. and vert. alignment. COMPLETE WITH ALL TUBES, HARDWARE AND STEP-BY-STEP CONSTRUCTION BOOK.  
BIG NEW 8" SCOPE 300K with additional features **\$139.50**  
630K RF AF TV & MARKER GENERATOR KIT **\$33.95**  
(630KA pre-assembled head \$38.95) (630W wired) **\$53.95**  
633K UNIVERSAL AF SINE, SQUARE & PULSE GENERATOR KIT **\$33.95**  
(633 wired) **\$52.95**  
610K RF SIGNAL GENERATOR KIT **\$23.95**  
(610KA pre-assembled head \$28.95) (610 wired) **\$39.95**  
607KUTV KIT WITH 7 1/2" SETS **\$57.95**  
(607 wired)



MODEL 300 K **\$94.95**



### UHF BOW-TIE AND REFLECTOR Channels 14-83

Pre-assembled ready to install. Complete with "U" clamp to fit made up to 1 1/2" UHF-5 Reflector. Vise with Corner Channels 14-83 **\$3.49**



Stop Fiddling With Your Indoor Antenna!!!  
UHF/VHF DIRECTRONIC INDOOR TV ANTENNA  
Flick of beam selector switch electronically rotates antenna for clearest picture on any channel instantly. Equal to outdoor antenna in metropolitan areas. Channels 2 to 83. Model 3D **\$6.95**  
Write for Quantity Prices

### SCOTT 99-A HI-FI 10 WATT AMPLIFIER PLUS PRE-AMP

All in One Compact Cabinet  
Self-Contained **\$99.95**  
Power Supply...  
A complete wide-range control and power amplifier built as a single "front-end" style unit. Separate 3 position turnover and rolloff equalizers give 9 record equalization curves. Inputs for magnetic, crystal or constant amplitude pickups. Three high level inputs for tuner, tape and TV. Frequency response flat 20 cps to 30,000 cps. 13 1/2 x 2 1/2 x 9 1/2. 4-8-16-500 ohms.



### FROM OUR BARGAIN COUNTER

- 4" Square, PM ALNICO V SPEAKER **\$1.10**
- 5" Round, PM ALNICO V SPEAKER **\$1.30**
- 6" x 6" oval, PM ALNICO V SPEAKER **\$1.50**
- PM PICTURE TUBE BRIGHTENER. For use with parallel circuits **\$1.49**
- 3 SPEED PHONO MOTOR WITH 5" TURNTABLE **\$9.95**
- CRYSTAL PHONO CARTRIDGE, 78 RPM **\$5.95**
- 3 V. OUTPUT **\$1.95**
- GURDEMAN TUBULAR ELECTROLYTIC COND. 50-20 mfd. 150 v. or 18 mfd. 450 v. Choice **29c**
- CARDON FILM RESISTORS FOR TV 2 meg. 2 watt 1 1/2% tol. **.49c**

### GENERAL ELECTRIC HI-FI CUSTOM MATCHED ENSEMBLE



- A1-200 PREAMPLIFIER. Self-contained, self-powered unit functioning as an equalized preamplifier for variable reluctance cartridges, plus aid, record compensation, tone, program input selection, bass and treble tone controls and loudness control. Inputs: variable reluctance pick-ups; FM-AM tuner; TV sound or tape recorder **\$57.95**
- A1-300 POWER AMPLIFIER. 10 watts output. From 20 to 15,000 cps. ± 3 db. 4, 8, 16 ohms. **\$77.75**
- For high fidelity, high quality amplification.
- A1-400 15" DUAL COAXIAL SPEAKER. Features new slotted baffle plate and pressure equalizer. From 20 to 15,000 cps. Impedance 8 ohms. 25 watts per rating **\$41.95**
- 12" or 16" DELUXE TONE ARMS. For home or broadcast use. Calibrated stylus pressure adjustment 1 to 10 grams. 12" arm model A1-500 **\$24.95**
- 16" arm model A1-501 **\$25.95**
- A1-406 SPEAKER ENCLOSURE. Blondo or Mahogany. For 12" speaker **\$59.95**

### SPECIAL! "STANDARD COILS" SUPER CASCADE TV TUNER

Series TV-200 For High Profit Replacement  
Has tube complement of 636 one and two, and a 6BQ7 or 6BZ7 as RF amp. Designed for inter-carrier circuit and also adaptable for split sound IF circuits such as the "630" and similar types, by use part 2 XM-752 trap assembly. (Available separately. IF in all) 10 to 26 mc. Adaptable to UHF. Shaft length 4 1/2" overall. **\$1.14**  
UHF STRIPS. Available for Standard Coil tuners. Specify channel no. and series designated by letter such as F, G, Q, etc. stamped on each strip of your present tuner. Set loc. & BIL **\$7.50**



TV TUNER FOR OLDER SETS  
Series TV-200. Standard coil's original type tuner. Has sound trap which can be eliminated for use in inter-carrier circuits. Sound IF of 21.25 mc. Shaft length 3" overall. Pre-aligned. Complete with tubes **\$16.95**

WESTINGHOUSE GAMMA COUNTER TUBES  
Was \$50. Alpha Beta and Gamma Counter Tubes. Self-quenching. 25070-BB-1 **\$8.95**  
Was \$35. Gamma Counter Tubes. Self-quenching. 25080-BB-2 **\$4.95**

**WHOLESALE RADIO PARTS CO., Inc.**  
311 W. BALTIMORE ST., BALTIMORE 1, MD.

Sangamo Molded Plastic 600V. Tubular Cond.			
.0008	.10	.025	.12
.001	.10	.025	.12
.002	.10	.025	.12
.0025	.10	.025	.12
.003	.10	.025	.12
.0033	.10	.025	.12
.004	.10	.025	.12
.0047	.10	.025	.12
.005	.10	.025	.12
.0055	.10	.025	.12
.01	.10	.025	.12

## BECOME AN ELECTRICAL ENGINEER



### Bachelor of Science Degree in 36 months.

Major in Electronics or Power.  
Now, prepare for a career in  
these rapidly expanding fields.

This school will prepare you to be-  
come an engineer, technician or serv-  
ice man. Previous military, academic  
or practical training may be evaluated  
for advanced credit.

### Enter Both Radio and Television

In 12 months you can attain the Radio-  
Technician's certificate. An added 6  
months course qualifies you for the  
Radio-TV Technician's certificate and  
the Degree of "Associate in Applied  
Science." The Technician's course is the  
first third of the program leading to  
a Bachelor of Science Degree in Elec-  
trical Engineering with a major in  
Electronics.

Also offered: 12-month Radio-TV serv-  
ice course; 12-month Electronics or  
Electro Technician Courses; 6-month  
Electrical Service Course and 3-month  
refresher and general preparatory  
classes.

### Terms Open Jan., March, June, Oct.

Famous for its Concentric Curriculum.  
Faculty of specialists. 50,000 former  
students. Annual enrolment from 48  
states and 23 overseas countries. Non-  
profit. 50th year. Courses approved for  
Veterans.



## MILWAUKEE SCHOOL OF ENGINEERING

MILWAUKEE SCHOOL OF ENGINEERING  
Dept. RN-1253 1025 N. Milwaukee  
Milwaukee 1, Wisconsin

Send: ☐ Free 45-page "Your Career" booklet  
describing Electrical Engineering Courses;  
☐ Booklet on Careers in Radio-TV.

I am interested in.....  
name of course

Name..... Age.....

Address.....

City..... Zone... State.....

If veteran, indicate date of discharge.....

## D.C. Amplifier (Continued from page 83)

pedance scale shifting to the right by  
a factor of ten for approximately a  
doubling of current. The power curve  
is not the product of the voltage gain  
and current gain curves because the  
signal voltages and currents were  
computed from  $E_s/R_s$  while the power  
input was computed from  $E_s^2/4R_s$ . All  
points were for constant output power  
at full-scale meter deflection: 20 mi-  
croamperes, 1850 ohms, 37 millivolts,  
0.74 microwatt. This treatment may  
appear rather unorthodox but is more  
indicative of circuit performance in  
the face of a basic concept of good  
instrumentation (which postulates that  
the power expended in the measuring  
system must be small compared to the  
total power in the circuit being meas-  
ured) than other presentations that  
could be used.

The parenthetical remark indicates  
more clearly why the circuit fails (in  
a usage sense) at maximum power  
gain because at this point the im-  
pedances are matched and the two  
powers are equal.

In the early months of transistor  
history, much was made of the fact  
that here, for the first time, was a  
device that could be regarded as a  
current amplifier. In the intervening  
years, however, very little has ap-  
peared in the form of practical de-  
vices making use of this important  
and interesting property. This being  
so, it may be permissible to emphasize  
the current-amplifying properties of  
the present device and gloss over its  
rather mediocre performance as a  
voltage amplifier.

From a source impedance, then, on  
the order of 50,000 ohms or more (de-  
pending upon the operating point cho-  
sen) the current gain of the circuit is  
approximately the grounded-emitter  
current amplification of the transistor  
multiplied by the shunting effect of  
the load resistors across the meter:  
 $CG = [a/(1-a)] [R_L/(R_L+R_m)]$  approx.  
where:

$CG$  = the current gain (expressed  
as a factor)

$R_L$  = collector-to-collector load

$R_m$  = meter resistance.

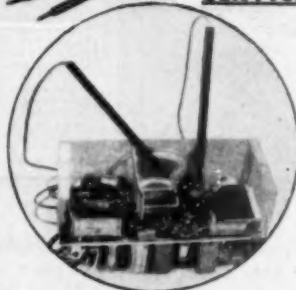
The foregoing neglects the further  
shunting effect of the collector resist-  
ance because this will be at least sev-  
eral hundred-thousand ohms.

Interesting and informative com-  
parisons may be made between the  
d.c. transistor amplifier and its vac-  
uum tube counterpart. In a d.c. vac-  
uum-tube voltmeter of the balanced  
cathode-follower variety, the "bottom"  
tube usually functions mainly as a  
balancing tube, to stabilize zero in the  
face of changes in contact potential  
and emission with changes in cathode  
temperature. While the balancing  
transistor is even more necessary in  
the transistor amplifier (although for  
a different reason) the second trans-  
istor is active dynamically and does

## NEW GRIP TIP® TEST PROBE



**SPEEDS  
UP TEST  
AND  
SERVICE**



**Acclaimed by Electronics  
Engineers and Radio and TV  
Service Personnel**

**★ ELIMINATES SPRING TYPE LEADS  
★ REACHES, GRIPS AND HOLDS  
★ EXCELLENT FOR CHECKING  
INTERMITTENT CIRCUITS**

- no shorts
- no hand capacity error
- locks-on tube pins up to 1/8" dia.
- reaches into chassis and grips firmly for an absolute "Hada-Off" probe procedure
- positive, easy foot-proof action; simply "Press it on — Twist it off"
- eliminates shock, reduces fumbling

### THE PHOSPHOR BRONZE TIP IS THE CLIP



Guaranteed high conductivity; positive Grip  
Tip Probes are equipped with 48" with kink-  
less, rubber-covered test lead wire. The extra  
long 5 1/2" plastic handle (one red, one black)  
reaches into the chassis to securely "lock-on"  
terminals, solderlugs,  
chassis wires (12 to  
24 gauge) and tube  
pins. Ideal for  
point to point  
testing.

### Patented Grip Tip JUMPER

Makes positive  
temporary connec-  
tion of compo-  
nents. Perfect for  
tube base pins,  
solder lugs, chassis  
elements. Elimin-  
ates haywire lash-  
ups. Completely  
insulated for hot  
circuit work 1  
doz. assorted sizes  
from 4" to 18"

**\$1.25.**

Free sample pair of  
Jumpers with every  
Test Probe.

### ORDER TODAY

**\$1.25** Phone Tip

**\$1.50** Banana Tip

Unconditional Money-  
Back Guarantee

**SCIENCE  
ELECTRONICS, INC.**

SCIENCE ELECTRONICS, INC.  
Huntington, New York

Enclosed find ☐ check ☐ money order

☐ Jumpers

☐ pair GRIP-TIP with phone tip

☐ pair GRIP-TIP with banana tip

Name.....

Address.....

City..... State.....

not "shunt down" circuit sensitivity as is often the case with balanced tube circuits. Also, it is usually the practice to ground the lower grid of the tube circuit because of troublesome ground capacitances and currents while the transistor circuit, being a relatively low impedance circuit containing very little in addition to the meter movement, need not be grounded and can therefore be operated at a considerable impedance to ground. The "bottom" transistor, then, is at the bottom only on paper and actually there is no necessity to designate "high" or "low" terminals at the input nor to provide a polarity-reversing switch (except as a convenience) at the indicating meter.

Certain types of laboratory and service instruments would appear to be logical candidates for improvement, through transistorization, in one or more of the following particulars: Instrument size and weight; number of components; manufacturing costs; performance; etc. For example, the volt-ohm-milliammeter class of instrument (as exemplified by the Simpson Model 260 and the Triplett Model 630-A), which at present uses a 50 microampere movement can offer 200,000 ohms-per-volt and 1.5 to 5 megohms at center-scale in the same instrument size at slightly higher cost. For this purpose, the CK722, with a current gain of 10 or 12 should be adequate. Or, conversely, the performance of the d.c. vacuum-tube instrument (of the balanced cathode-follower type referred to before) can be approximately equalled in a smaller instrument of the same or possibly lower cost.

While much of the foregoing also applies, of course, to a.c. amplifiers and instruments, it will be understood that the present discussion is confined to d.c. This is partly because there is such a glaringly obvious discrepancy between the power supply requirements of d.c. instruments (particularly battery-operated instruments) and what may and should be possible with transistors. In this class of instrument with its plethora of batteries, including separate "A" batteries, "B" battery, coupling batteries and bucking battery, it is not unusual for the weight and bulk of the power supply to exceed 75% of the total. Further, if the designer attempts to reduce this percentage substantially, the usual result, on meters used only intermittently, is a considerable loss of time in servicing operations. To this may be added the difficulty of maintaining fresh stocks of several types of batteries in the usual situation where most of the available instruments require different battery types.

Among the d.c. instruments which are often battery operated may be mentioned: photometers, densitometers, pH meters, spectrophotometers, infrared amplifiers, strain gauge amplifiers, mass spectrograph leak detectors, etc. While most of these require the sort of input impedance which can only be realized from electrom-

December, 1953



# PAMPER

## YOUR TV AND RADIO SETS

### WITH DEPENDABLE OHMITE® REPLACEMENTS

## Little Devil® COMPOSITION RESISTORS



Tiny, yes... but what dependability, ruggedness, and stability! And they provide an extra margin of safety—being rated at 70C rather than 40C. Completely sealed and insulated by molded plastic, they meet all JAN-R-11 requirements... are available in 1/2, 1, and 2-watt sizes in all RTMA values.

## TYPE AB NOISE-FREE POTENTIOMETERS



Because the resistance material in these units is solid-molded—not sprayed or painted on—continued use has practically no effect on the resistance. Often, the noise-level decreases with use... and they provide exceptionally long, trouble-free service. Rated at 2 watts, with a good safety factor.

## BROWN DEVIL® AND DIVIDOHM® RESISTORS



BROWN DEVIL fixed resistors and DIVIDOHM adjustable resistors are favorite vitreous-enamelled units! DIVIDOHM resistors are available in 10 to 200-watt sizes; BROWN DEVILS in 5, 10, and 20-watt sizes.



WRITE FOR  
STOCK  
CATALOG



OHMITE MFG. CO.  
3634 Howard St.  
Skokie, Ill.  
(Suburb of Chicago)

Be Right With...  
**OHMITE**

RHEOSTATS • RESISTORS • TAP SWITCHES



Such d.c. amplifiers working from low impedance thermal and mechanical transducers and not requiring the electrometer input stage will undoubtedly pose rather severe problems in relation to temperature drift at the input transistors—the severity of the problem varying according to the over-all gain required and the maximum drift that can be tolerated. In applications where these requirements are particularly stringent, the most careful attention to the complete thermal circuit associated with the input stage will be necessary. In those extreme cases where temperature control appears to be unavoidable, the separate transistor amplifier associated with such a control would be a relatively simple and straightforward affair since, as already remarked, a transistor amplifier intended to amplify a temperature signal is much easier to design, circuit wise, and construct than one which must produce nearly zero output for the same kind of signal.

The long-term stability of the temperature characteristics of junction transistors has yet to be determined. However, to judge by our present knowledge of this subject, it appears likely that the "zero adjust" control commonly found in d.c. amplifiers need have no greater (and quite possibly less) range in a transistor amplifier than in the vacuum-tube instrument it replaces.

To those who have not yet touched transistors, the meter amplifier described earlier in this article may be recommended as a relatively painless introduction; while the design engineer, steeped in the lore of his own particular specialty—whether it be micro-waves, radar, pulse modulation, or computers—should not have too much difficulty in mastering the intricacies of the circuit illustrated in the diagram of Fig. 3.

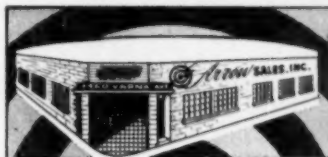
## RADIO SERVICE HINTS

By JACK DARR

A FADA 659 table model radio set came into the shop with an intermittent; when the humidity went up, the oscillator went out. After checking all the common causes of this trouble, a leakage was discovered in the insulator of the oscillator section of the tuning condenser. It was removed, baked out, and checked. The leakage disappeared, and the insulator was given a coat of "Q" dope and baked again.

Many 1953 Buick autos use a top-mounted antenna for the radio. If the radio in this auto suffers from an intermittent loss of volume, check the antenna lead-in for shorts. The lead-in cable on this car runs in the trim strip that holds the windshield, and is held in place by small metal clips. If the clips are not properly installed, one of the mounting screws can penetrate the cable, causing a short.

By taking out the trim mounting screws you may spot the cable through one of the holes. Remove the trim, patch the cable, and set the clip properly.



**FOLLOW ARROW FOR BIGGEST STOCK AT LOWEST PRICES**

• RADAR—TRANSMITTERS  
• RECEIVERS — TUBES — PARTS



**C.A.P. SPECIAL  
BC-425 VHF  
TRANSMITTER**  
Freq. range 100-156 MC. With modulation section. Less tubes & crystals, with conversion dope. Used, good condition.....

**\$9.95**



**UHF  
Transmitter**

450-710 MC. Tunable Transmitter. 10 W. output. Two 300-type tubes as push-pull oscillators. Wide band video amplifier. Less tubes, with schematic. Excellent condition.....

**\$8.95**

**UHF 420 MC  
TRANSMITTER**

Complete transmitter-receiver unit with 5 stages of 30 MC. IF amplifier. This unit is the famous AP6-12 Radar Set. Less tubes, dynamotor. With schematic. Excellent condition.....

**\$9.95**

Less R.F. section, tubes and dynamotor.....

**\$5.95**



**INTERPHONE AMPLIFIER  
BC-700-B**

A 2-position single stage audio amplifier. Uses 1 tube and operates from self-contained batteries. With Instruction Manual and Schematic. NEW (less batteries).....

**\$3.95**

**R-2B/ARC-5 RECEIVER**

100-156 MC. With tubes. Excellent condition.....

**\$45.00**

**MOTOROLA MODEL TR-20-18 MOBILE 2-WAY RADIO.** Used condition.....

**\$150.00**

## RADAR TEST EQUIPMENT

TS-2, TS-12, TS-13, TS-15, TS-23, TS-24, TS-35, TS-36, TS-45A/ME.

## COMMAND EQUIPMENT (SCR-274N)

	Used	New
BC-442 ANTENNA RELAY. Less cond.	\$1.95	
BC-451 TRANSMITTER CONTROL BOX		\$ 3.95
BC-450 3-RECEIVER REMOTE CONTROL BOX		1.50
MC-215 MECHANICAL DRIVE SHAFT. Per length.....		2.95
BC-499 2-POSITION RECEIVER CONTROL BOX.....		3.95
BC-454 RECEIVER. 3-6 MC. With tubes.....	12.95	
BC-455 6-9 MC RECEIVER. With tubes	9.95	14.95
BC-457 TRANSMITTER. 4-5.5 MC. With tubes.....	9.95	

	Used	New
BC-458 TRANSMITTER. 5.3-7 MC. With tubes.....	\$9.95	
BC-459 TRANSMITTER. 7-9 MC. With tubes.....	9.95	
MC-211 90° ANGLE COUPLING UNIT. FT-334 MOUNTING RACK for single transmitter.....	2.95	3.50
FT-335 MOUNTING RACK for 2 Command Receivers.....		3.95
FT-331 MOUNTING PLATE for FT-320 FT-320 MOUNTING RACK for 3 receivers.....	2.25	3.95
FT-325 MOUNTING PLATE for BC-156 BC-458 MODULATOR. For SCR-274. Complete set of 4 tubes for transmitter.....	5.75	1.25

## Miscellaneous Specials!

H-16U HEADSET. 8,000 ohms.....	\$3.95
H-18 HEADSET. New.....	2.45
H-23 HEADSET. High imp. New.....	4.95
H-30 HEADSET. Featherweight type. Low imp. New.....	\$2.45
H-33 HEADSET. Low imp. New.....	1.49
H-38 HEADSET. USED, excel. cond.....	6.99
NEW.....	3.50
T-32 DESK STAND MIKE. New.....	5.95
T-48 DESK STAND MIKE. New.....	4.95
LIP MIKE. Navy type. New.....	.98
MP-22 MOBILE ANTENNA MOUNTING RACK. Comp. with hardware. Per Pair \$4.95. Ea. Xmitr. Used.....	2.95
TU-17 TUNING UNIT. (2-3 MC.) For BC-223 Xmitr. Used.....	2.95
TU-25 TUNING UNIT. (3.5-5.2 MC.) For BC-223 Xmitr. Used.....	2.95
1-70 "B" TUNING METER. NEW.....	2.50
WOBULATOR. See p. 43 Dec. '51 RADIO NEWS.....	5.95
BC-1023 75 MC. MARKER BEACON RECEIVER. Complete with tubes, mtg. rack. NEW.....	10.95

**CCT-52232 NAVY COMMAND TRANSMITTER**  
2.1-3 MC. New, with tubes.....

**\$14.95**

250 TL TUBE.....Ea. \$9.95 Per Pair \$17.00

\$5.00 MINIMUM ORDER ACCEPTED. All items subject to prior sale. All shipments F.O.B. warehouse. Calif. residents add 12% with remittance. 20% deposit required. Please specify shipping instructions with order. EQUIPMENT WANTED! Highest prices paid for all types of Electronic Gear!

## Miscellaneous Specials!

PE-125 POWER SUPPLY. Operates on 110 or 240 V. battery. NEW.....	\$17.95
CD-307 EXTENSION CORD. For HS-23-33. NEW.....	.95
HS-38 MIKE. Excellent cond. New.....	2.95
SCR-625 MINE DETECTOR. New.....	\$9.95
BC-605 INTERPHONE AMPLIFIER. With dual mike input circuit. NEW.....	5.95
TELEPHONE REPEATER AMPLIFIERS: EE-99. New, with tubes.....	17.95
EE-80. New.....	12.95
FL-9 RANGE FILTER.....	1.95
PL-68 MIKE PLUG. New.....	.70
PL-55 HEADSET PLUG. New.....	.50
IN-4A L/R TUNING METER. Used.....	3.95
PL-5 RANGE FILTER.....	1.25
TS-10 SOUND POWERED HAND SET—Used.....	14.80
cond. Per Pair.....	
PR-58 DYNAMOTOR 15 V. Input. 500 VDC @ 200 mls output. New.....	24.50
FIELD TELEPHONE. EE-8. Complete BHAND NEW SPECIAL ONLY.....	27.50
SC OVERLOAD RELAY. West. 0.3-1.0 amps.....	6.50
3A-255 MC RECEIVER.....	17.95

## INDUSTRIAL CORPORATIONS

We carry one of the most complete stocks in U. S. of Military Electronic Equipment, Test Equipment, and Aircraft Electronics. Call or write for free catalogue.

**ARROW SALES, INC.**

Cable Address: ARROWSALES POPlar 5-1510

Mailing Address:  
P. O. Box 3878-R, N. Hollywood, Calif.  
Office-Warehouse:  
7460 Verna Ave., N. Hollywood, Calif.

## DYNAMOTORS

TYPE	INPUT VOLTS	AMPS	OUTPUT VOLTS	AMPS	PRICE
DM 416	28	9.2	170	3.75	
DM 33A	28	9.2	280	3.98	
ED AR 93	28	3.35	375	7.80	
23350	27	1.7	36	3.98	
6-10 Push	12	9.4	275	1.10	8.98
DA-3A*	28	10	300	2.60	6.08
			150	.010	
5057	28	14	250	.060	3.98
PE 73 CM	28	19	3000	2.80	22.50
BD 693	14	2.8	220	.08	12.98
D-402	13.5	12.2	300	.300	
			8.8VAC		12.50
SP 175	18	3.3	450	.06	4.49
DM 25	12	2.3	250	.08	6.98

\* Used, Excellent

## INVERTERS

PE-218-M: Input: 25/28 vdc, 92 amp, Output: 115v, 350/500 sy 1500 volt-amperes, NEW.....\$44.50  
 PE-206: Input: 28 vdc, 38 amps, Output: 80 v 800 cy, 550 volt-amps, Dim: 13"5/8" x 10"1/2".....\$23.50  
 NAVY COR-211005: Input 22-30 VDC/75-60A, OUTPUT: 115V/400 CY, 1 KVA/6.7A, RPM: 4800, With coupling provision for motor, Brand New Original packing.....\$150.00

## This Month's Special

### UNDERWATER MICROPHONES

Originally designed for use in harbor defense equipment, these amazing hydrophones may be coupled to any hi-gain audio amplifier. For listening to underwater sounds such as schools of fish, shrimp, lobster, etc. Ideal for fishermen, sailors, students. Available in two models described below:

JR HYDROPHONE: Consists of a mosaic of 7 crystals encased in a rubber sheath approx. 4" diam, and 4" long. Directivity is essentially horizontal. A matching transformer is "built-in," permitting use of long cable runs without loss.....\$24.50

M-1 HYDROPHONE: A lattice of 3 crystals encased in a rubber disk approx. 1 inch thick and 6 inches diameter. Directivity is essentially vertical (downward). Complete with ompheneo fitting.....\$27.50

### SUPERSONIC OSCILLATOR

FOR EXPERIMENTERS, TEACHERS, TECHNICIANS. DELIVERS 30 WATTS OF R. F. TUNABLE FROM 17-27 KCS. ORIGINALLY DESIGNED AS DRIVER UNIT FOR 500 WATT SONAR SET. OPERATES FROM 115V, 50 CYCLES. BRAND NEW, RACK-PANEL SIZE, COMPLETE WITH ALL TUBES.....\$119.25

### CIRCUIT BREAKERS

Heinemann: 01A, 2340 V—insulated for 5000 V. Separate tmls. For coil and contact.....\$1.95  
 #1510 M-7 7A, 24 VDC, SCB #3H900-7-3.....1.65  
 2AM 1614-100: 100 Amps, 100 VDC.....1.65  
 2AM 1614-50: 50 Amps, 24 VDC.....1.45  
 2AM 1610-5: 500 MA, 1000 VDC, Curve 3, SCB #3H900A-50.....2.25  
 SCB #3H900-10-3: 40 VDC, 10 Amps.....1.85

### POWER TRANSFORMERS

Comb. Transformers—115V/50-60 cps Input  
 CT-15A 550VCT .055A 6.3V/6A, 6.3V/1.8A.....\$2.85  
 CT-341 1050 10 MA—625V @ 3 MA, 26V @ 4.5A, 2x2.5V/3A, 6.3V @ 3A.....9.95  
 CR 825 360VCT .340A 6.3VCT/3.6, 6.3VCT/3A.....3.95  
 CT-626 1500V .160A 2.5/12, 30/100.....9.95  
 CT-071 110V .200A 33/200, 5V/10, 2.5/10.....4.95  
 CT-367 580VCT .050 A 5VCT/3A.....2.25  
 CT-403 350VCT .020 A 5V/3A.....2.75  
 CT-931 585VCT .086 A 5V/3A, 6.3V/6A 4.25  
 CT-456 390VCT 30 MA 6.3V/1.3A, 5V/3A 3.45  
 CT-931 585VCT 8E MA 5V/3A, 6 V/6A 4.95  
 CT-442 525VCT 75 MA 5V/2A CT/2A, 90V/200 MA.....3.85  
 CT-720 550-0-550V/250 MA, 6.3V 1.8A.....8.95  
 CT-43A 600-0-600V/.08A, 2.5VCT/EA, 6.3VCT/1A.....6.40  
 CT-444 230-0-230V/.085A, 5V/3A, 6V/2.5A.....4.40  
 CT-706 300-0-300V/120MA, 2 X 5V/3A, 2.5V 5A 3.65  
 CT-129 530-0-530V @ 150MA, 6.3V/4A, 2.5VCT/5A.....8.79  
 CT-013 450-0-450V @ 200MA, 10V/1.5A, 2.5V/3.5A, 5V/3A.....6.95  
 PT-706 1500-0-1500V @ 300 MA.....14.95

Filament Transformers—115V50-60 cps Input  
 Item Rating Each  
 FT-157 4V/16A, 2.5V/1.75A.....\$ 2.95  
 FT-101 6V/25A......79  
 FT-924 5.25V/21A, 2x7.75V 6.5A.....14.95  
 FT-624 2x20V/2.9A, 16V/1A, 7.2V/7A.....6.95  
 FT-463 6.3VCT/1A, 5VCT/3A, 5VCT/3A.....5.40  
 FT-35-2 7.2V/21.5A, 6.3V/6.85A, 5V 6A, 5V/3A.....8.95  
 FT-38A 6.3/2.5A, 2x2.5/7A.....2.79  
 FT-A27 2.5V/2.5A, 7V/7A, TAP 2.5V/2.5A, 16 V TEST.....12.50  
 FT-808 6.3V 3A/750V TAP.....1.79  
 FT-873 4.5AV/3A, 7V/7A.....2.79

Send M.O. or Check Shipping Chk. I.C.O.D.  
**COMMUNICATIONS EQUIPMENT CO.**  
 131 Liberty St. Dept. N-12 New York City 7, N. Y.

# MANUFACTURERS' LITERATURE

The various listings presented in this section are for your convenience. The bulletins, unless otherwise indicated, are available to all our readers. For prompt attention write directly to the manufacturer for this literature.

### PISTON-TYPE TRIMMERS

Engineers, purchasing agents, and electronic parts jobbers are invited to write in for the new four-page brochure on piston-type variable trimmers just released by JFD Manufacturing Company, Inc. of 6101 16th Ave., Brooklyn 4, N.Y.

Known as form No. 220, the new publication lists units for industrial, military, experimental, and radio trade requirements.

Also available from the company is a one-page flyer detailing the company's new miniature u.h.f. piston type, the "Mighty Midget" model VC3-G. This publication, form No. 226, is obtainable from the same source.

### TV ACCESSORIES

United Technical Laboratories, Morristown, N.J. has issued a new bulletin which describes eight new television accessory products.

Items described include a new TV interference filter, u.h.f.-v.h.f. cross-over network, two-receiver TV coupler, a calibrated variable inductance kit, and new "Klipzons" for panel mounting. Also included are alligator clip adapters and banana plug adapters.

Copies of this new bulletin are available from the company, its regional sales representatives, or its distributors.

### EM FOCUS COILS

Two new electromagnetic focus coils are illustrated and described in the new catalogue page currently available from Syntronic Instruments, Inc. of 100 Industrial Road, Addison, Illinois.

The Type F10, for 1½" neck diameters, is for laboratory, military, and special-purpose applications. The type F30, for 2½" neck diameters, is for projection, laboratory, and special-purpose applications. Complete technical information includes dimensional drawings and electrical and mechanical data.

### RADIO SHACK CATALOGUE

Radio Shack Corporation, 167 Washington Street, Boston 8, Mass. has just published its new 1954 electronic parts mail-order catalogue.

The 224-page edition is the largest the company has published in its 31-year history and includes a 32-page roto section covering high-fidelity custom music systems. Also included are extensive listings of transistors and germanium diodes, antennas, converters and test equipment for u.h.f.,

printed circuit components, and radiation detection apparatus.

Over 30,000 items are listed and illustrated in this new catalogue which is available from the company on request.

### SUPREME INDEX

Supreme Publications, 3727 West 13th Street, Chicago 23, Illinois is offering a copy of its "Master Index" to readers of this magazine who send in four cents postage and mention this publication.

The newly-published index covers the material in all of the company's thirteen radio manuals, all of the seven TV volumes, and the u.h.f. book. With the aid of this index, needed material can be quickly and easily located in the company's service manuals.

### STANCOR DATA SHEET

The Standard Division of Chicago Standard Transformer Corporation, Addison and Elston Streets, Chicago 18, Illinois has issued a new catalogue sheet, Bulletin 467, which describes six transformers recently added to the Stancor line of stock components.

Complete electrical and physical specifications are given for three power transformers, P-6348, PC8422, PM8422; two audio output transformers, A-3337 and A-3839; and a heavy-duty plate transformer P-8044 for ham use.

Copies of this new bulletin are available without charge from the company.

### 1954 HEATHKITS

Heath Company, Benton Harbor, Michigan has just released a new catalogue which lists, pictures, and describes its new 1954 Heathkit line.

Among the new items are a service scope, a laboratory generator, a new 20,000-ohm-per-volt multimeter, a record player kit, an a.c.-powered impedance bridge, a TV alignment generator, and a wattmeter which measures audio output level.

In addition, the catalogue lists other popular items in the company's extensive line of audio, radio, and test equipment.

A copy of the new catalogue is now available for the asking.

### TV REPLACEMENT TRANSFORMERS

The Standard Division of Chicago Standard Transformer Corporation, Addison and Elston Avenues, Chicago 18, Ill. has released a new Stancor bulletin, No. 469, entitled "TV Re-

placement Transformers Popularity Tables".

The publication, based on the company's new TV replacement guide, lists the number of TV models that use each *Stancor* replacement transformer. There are separate tables for each of the 55 major set manufacturers.

The bulletin is a valuable inventory aid for both the TV technician and the parts distributor. The user can plan a replacement transformer stock based on the most popular sets in his area.

#### ANTENNA BOOKLET

A 30-page illustrated booklet describing the entire "Vee-D-X" line of u.h.f. and v.h.f. antennas and accessories is currently available from *La-Pointe Electronics Inc.*, Rockville, Conn.

Some thirty-six different products, including the company's antenna rotator, are pictured and described in this handy, wallet-sized guide.

#### NEWARK CATALOGUE

*Newark Electric Company*, 223 W. Madison St., Chicago 6, Ill. is now offering copies of its comprehensive parts catalogue, No. 56.

This 196-page book contains thousands of listings covering items for industry, laboratories, high-fidelity fans, and radio and television technicians. Whole sections are devoted to test equipment, industrial equipment and supplies, high-fidelity systems and components, TV chassis, accessories and antennas, etc.

Copies of the new catalogue are available upon request to the company direct.

#### "TV ANTENNA FOLIO"

*American Phenolic Corporation*, 1830 South 54th Avenue, Chicago 50, Illinois now has available copies of its new "TV Antenna Folio" which graphically illustrates the importance of the antenna and its installation in obtaining a good TV picture.

With each copy of the "Folio" are enclosed the new *Amphenol* antenna and accessory catalogue sheets which contain complete gain charts and radiation patterns for the antennas pictured and discussed.

The company will supply a copy of this colorful and complete "Folio" on request.

#### "PERPETUAL" CATALOGUE

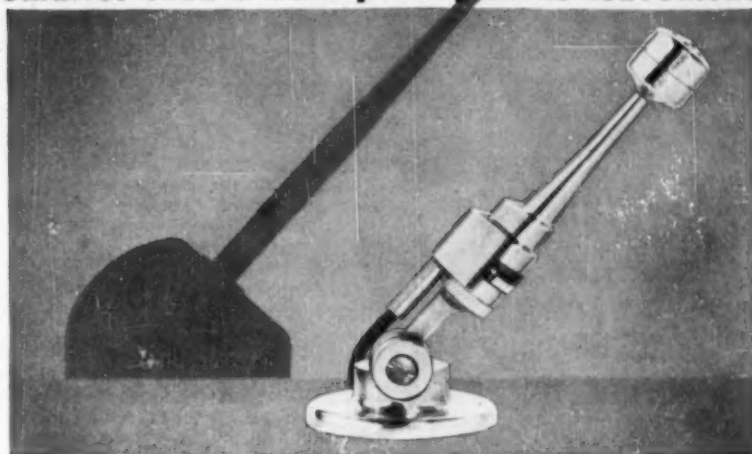
*United Catalog Publishers, Inc.*, 110 Lafayette St., New York 13, N.Y. has introduced its new "File-O-Matic" to the trade.

This new perpetual counter catalogue service, now being introduced to distributors, includes all products made by radio, television, and electronic parts and equipment manufacturers. Periodic replacement sheets on new and discontinued items will be issued to insure that this loose-leaf system is kept up-to-date.

Manufacturers' products are broken down into separate and distinct sections.

December, 1953

Smaller than a desk pen — just as convenient



## The NEW Turner C-4 Stand for Model 80 Microphone

The new C-4 stand gives complete maneuverability and convenience with the Model 80. It pivots the microphone in a 135° arc for any operational angle — swings parallel to base needing little more packing space than two packs of cigarettes.

The microphone is held firmly by the unique, positive-action hinge, yet moves smoothly and easily to any desired position without adjustment. Microphone quickly and easily removed.

This new, matching stand is solidly built of die-cast zinc overlaid with beautiful satin chrome plate. It is heavy enough to prevent tipping — it will not slide with the weight of the cord. The C-4 stand complements the graceful shape of the Model 80; the combined unit is an attractive but inconspicuous addition to a speakers' table. Ideal for use with wire recorders, public address systems, pulpits, office and factory call systems, amateur operators and other similar uses.

Model C-4 matching stand. 3/8" — 27 thread. List Price.....\$ 5.75

Model 80 Microphone. List Price.....\$15.95



### THE TURNER COMPANY

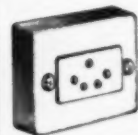
900 17th St., N. E. Cedar Rapids, Iowa

In Canada: Canadian Marconi Company, Toronto, Ont., and Branches

Export: Ad Auriema, Inc., 89 Broad Street, New York 4, N. Y.

## MOSLEY ROTATOR CONNECTOR

- Models For EVERY Rotator!
- Line Plugs—Line Sockets—Base Sockets  
—Flush Mounted Sockets!
- Solderless!
- Precision Molded Polystyrene!



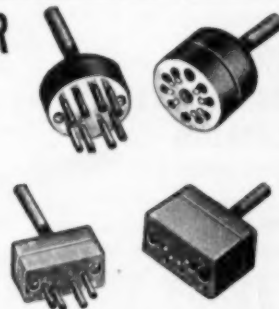
Available at Radio & Television Parts Distributors—Everywhere

Write For Folder 1002:

### MOSLEY ELECTRONICS, INC.

8622 St. Charles Rock Road

St. Louis 14, Missouri

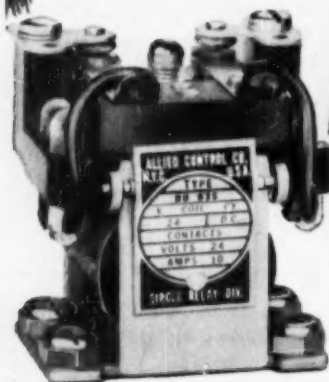


**24 HOUR  
DELIVERY  
FROM STOCK!**

## RELAYS

Our stock of more than a million relays — in over a thousand different types — is the world's largest. Don't delay your production for want of large or small quantities of relays of any type.

Telephone, wire or write for quotations.



NEW AND MORE  
COMPREHENSIVE

**1953  
RELAY SALES  
CATALOG**  
NOW READY

Be sure to send  
for your copy



Telephone

SEely 8-4146

**Relay  
Sales**

833 W. CHICAGO AVE.  
DEPT. 8, CHICAGO 22, ILL.

tions with all similar products being grouped together in one section, thus eliminating excessive and unnecessary time searching for products information.

Additional information on the "File-O-Matic" is available on request.

### DAVIS BULLETIN

Davis Electronics, Box 1247, Burbank, California has issued a four-page, two-color catalogue and technical data folder giving complete information on the company's "Super-Vision" television antenna.

The publication provides technical data of interest to TV dealers and the technicians who make the installations. The essentials of a 61-page laboratory report on the antenna, as supplied by Microwave Engineering Co., have also been presented in condensed form.

A copy of this No. SV-7 catalogue-data sheet is obtainable from the company, its jobbers, or jobber salesmen.

### CONVERTER DISPLAY

Blonder-Tongue Laboratories, Inc. of 526-536 North Ave., Westfield, N.J. is now offering a point-of-sale display easel which will accommodate one of the company's "Ultraverter" u.h.f. converters.

The new display is supplied free of charge to dealers and distributors on request, and, in addition, is included in each master carton of twelve units. It is only one item in the company's comprehensive sales promotion program.

### TRANSISTOR MANUAL

CBS-Hytron of Danvers, Mass., has recently issued a down-to-earth, comprehensive, 8-page transistor manual which is currently available without charge from the company's distributors or the company itself.

Profusely illustrated, the new manual is divided into three parts covering theory, data, and application. Included are nine different basic transistor applications. Both point-contact and junction transistor operations are explained by vacuum-tube analogy.

Conduction by "holes" and the "p-n-p" and "n-p-n" types is explained in detail.

### CONSUMER BOOKLET

Jensen Industries, Inc., 329 S. Wood St., Chicago, Ill. has issued a two-color, pocket-sized booklet on the care of records, needles, pickups, and cartridges.

This booklet, designed as a consumer publication available for dealer distribution, illustrates needle wear comparison, information on caring for the phonograph, as well as providing a comprehensive chart showing how to determine exact needle replacement for specific record players.

### ELECTRICAL FITTINGS

Buchanan Electrical Products Corporation, Hillside, New Jersey has recently issued its Catalogue 53, 16 pages describing the company's complete line of solderless wire connectors and specialized electrical fittings.

Complete specifications, dimensional data, application information, and ordering instructions are included in this publication which is available on request.

### TEST EQUIPMENT

Radio City Products Company, Inc., 152 W. 25th St., New York 1, N. Y. has issued a four-page illustrated catalogue covering its line of test and measuring equipment.

Complete specifications and data are included on the entire test line with particular emphasis given to the company's recently introduced instruments—Model 750 "Do-All" pattern, marker, and signal generator for u.h.f. and v.h.f. and the Model 324 tube and battery tester.

### ENVELOPE STUFFER

Snyder Mfg. Co. of Philadelphia, Pa. is now offering a new envelope stuffer for mailing to the TV trade.

The three-color publication describes the company's two-set TV coupler, the Model AC-800. As illustrated, the coupler permits two receivers to be operated from a single antenna.

The stuffer also illustrates a colorful printed sales package.

Howard W. Sams & Co., Inc., Indianapolis publisher of electronics service and technical data, has announced plans for a 38,000 square foot concrete and steel building to be erected on a six-acre tract of land at 33rd and Sutherland Ave., in Indianapolis. The building, which will cost an estimated \$200,000, will house printing, warehousing, and shipping operations of the firm. These operations, now being carried on at five different locations throughout the city, will be consolidated in the new building. The administration, sales, engineering, and analytical work will continue to be located at the company's main plant at 2201 E. 46th Street.



RADIO & TELEVISION NEWS

Now...another **RR**

**JAN TYPE**

**1N34A**

**GERMANIUM  
DIODE FOR  
MILITARY USE**

with the **PLUS** factor of  
polarity at a glance or touch

To the list of Radio Receptor diodes that can be designated JAN type comes another important model—1N34A. Built to the high standards of this designation, 1N34A as well as all Radio Receptor diodes gives you simplified polarity identification. The tapered case speeds up assembly, reduces possibility of error in connecting the diodes into the circuit, which all adds up to lowered production costs.

These JAN type diodes | 1N69 1N70 1N81  
now available for |  
prompt delivery | and now 1N34A

Many other types of diodes are available too, including a range of computer diodes made to meet special requirements. Radio Receptor also makes Germanium Transistors and SELETRON Selenium Rectifiers. Our engineers will gladly study your problems without obligation and submit their recommendations.

**Seletron and Germanium Division  
RADIO RECEPTOR COMPANY, INC.**

Since 1922 in Radio and Electronics  
SALES DEPT.: 231 West 19th Street, New York 11, N. Y.  
FACTORIES IN BROOKLYN, N. Y.

**Give the WORLD**

**the MIGHTY MIDGET**

SW-54  
The whole world of radio — from 540 kcs. to 30 mcs. in 4 bands — is yours to enjoy with this sleek, low-priced beauty! Hear foreign stations, including Radio Moscow, ships, amateurs, aircraft, police! Receives voice or code. All this plus the standard broadcast band — your favorite programs with new power and clarity.

**the WORLD MASTER**

NC-88

A truly professional communication receiver in every way, the World Master includes circuit refinements and features usually found only in receivers costing substantially more! It's the ideal choice for shortwave listeners, novices and experienced amateurs! Covers 540 kcs. to 40 mcs. in 4 bands.

**\$129.95**

**National**



BROADCAST

and SHORTWAVE RECEIVERS

Makers of U. S. Navy Receivers

MALDEN, MASS.

**Attention!!**

\* EXECUTIVES  
\* SALESMEN \* PUBLIC OFFICIALS  
\* POLICEMEN \* FIREMEN \* OUTDOOR MEN  
REPORTERS \* FIELD INSPECTORS \* DOCTORS \* LAWYERS, ETC.

**DICTATE IN YOUR  
CAR**

with

**ATR**

**INVERTERS**

for changing your battery current to

A.C. Household CURRENT

Anywhere ....

in your own car!!

ATR INVERTERS ... especially designed for operating standard 110 volt A.C. Tape Recorders, Wire Recorders, Dictating Machines and Electric Razors IN YOUR CAR.

**EASY TO INSTALL  
EASY TO OPERATE**

**\$25.55  
AND UP**

A VALUABLE TIME SAVER FOR:

- TRAVELLING SALESMEN—Dictate reports in your own car. Send your dictated reports in daily to your home office or sales manager.
- FIELD INSPECTORS & INVESTIGATORS—Dictate your field inspection reports in the field—on the spot. Give the complete story factually and completely. Include your client's name and address.
- DOCTORS—Dictate and record your hospital calls on the complete form of your call while everything is fresh in your mind. Have these records for transcription by your office staff.
- LAWYERS—Record evidence in the field at your client's premises. Obtain factual and complete witness reports, etc.
- EXECUTIVES—Dictate in your car all business matters while on trips for pleasure or business.
- PUBLIC OFFICIALS—Dictate complete field reports in your car. Obtain recorded opinions and expressions of Mr. Public in the field. Dictate your business reports while travelling.
- POLICE SQUAD CARS—Dictate accident reports right on the scene complete and factual. Include witness statements at the same time. Have the complete story available by dictation.
- FIRE TRUCKS—Dictate your fire reports, factually and complete on the scene and include witness reports. Have the complete story include witness recordings, etc.
- AMBULANCES—Obtain complete reports of your ambulance runs. Include witness recordings, etc.
- ADVERTISING AGENCIES—Use AC operated animated or illuminated displays in or on the car.
- FISHERMEN & HUNTERS—Use your electric razor on camping trips, operating in your car. Also small home radios and other electrical or electronic items.
- CAMPERS—Make your camping and outing trips more exciting using mini markets, tape recorders, or wire recorders operating from your car battery.
- WAREHOUSE & MATERIAL HANDLERS—Dictate your inventory and material handling reports on the scene, in the warehouse, yard, or wherever you may be.

**FREE!! ATR INVERTER!**

... given away every 30 days to lucky registrant of preceding month. Mail a postcard as your registration request today!

TYPE	Input DC Volts	AC Output All Cycles	Output Watts Intermittent	Output Watts Continuous	List Price	RECOMMENDED APPLICATIONS
6-LIF	6	110 volts	40	35	\$25.55	For operating small low-power AC motors, electric razors, small radios and small portable dictating machines having wattage consumption less than 35 watts.
12-LIF	12	110 volts	50	35	25.55	
6-RSD	6	110 volts	85	75	39.25	Recommended for operating small AC motors, Radio Sets, PA Systems, Amplifiers, and Radio Test Equipment having input wattage consumption within continuous output wattage ratings indicated.
12-RSD	12	110 volts	125	100	39.25	
6-ISO-F	6	110 volts	85	75	49.95	Especially recommended for operating dictating machines, wire recorders, tape recorders, and small AC motors and electronic or electrical apparatus having input wattage consumption within continuous output wattage ratings indicated.
12-ISO-F	12	110 volts	125	100	49.95	
6T-HSG	6	110 volts	175	150	96.45	For operating large tape recorders, wire recorders, PA Systems, amplifiers, and small TV sets having input wattage consumption within the continuous output wattage ratings indicated.
12T-HSG	12	110 volts	250	200	96.45	

See your dealer or write factory

✓ NEW MODELS ✓ NEW DESIGNS ✓ NEW LITERATURE

"A" Battery Eliminators, DC-AC Inverters, Auto Radio Vibrators

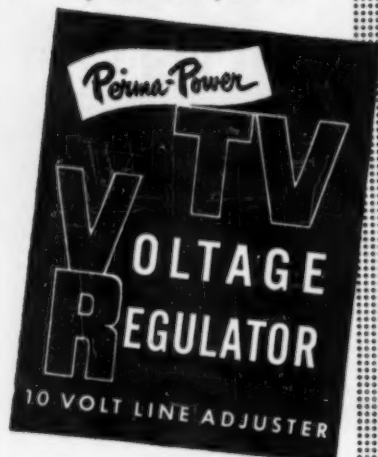
**ATR**

**AMERICAN TELEVISION & RADIO CO.**

Quality Products Since 1931

SAINT PAUL 1, MINNESOTA—U. S. A.

there's always  
something  
**new**  
being developed  
by *Perma-Power*



- NORMAL LINE VOLTS
  - 10 VOLTS INCREASE
  - 10 VOLTS DECREASE
- 300 WATTS**

List Price  
**\$6.75**

Sold Through  
Better Jobbers

manufactured by  
**Perma-Power COMPANY**  
Chicago 25, Ill.  
Manufacturers of Electronic Equipment Since 1928

## Recording System

(Continued from page 55)

The Fisher 50-C and Craftsmen (experimental model C-300) preamplifiers are designed in similar fashion and both are provided with a master gain control in addition to full facilities for circuit selection, equalization, and bass and treble control. Normally the gain controls on the two preamps are pre-set for equal outputs to the line amplifier and it is seldom necessary to alter the gain at the preamps except for mixing purposes. Further compensation is provided at the input to the line amplifier and the voltage gain is usually pre-set for smoothest response of the amplifier without overloading.

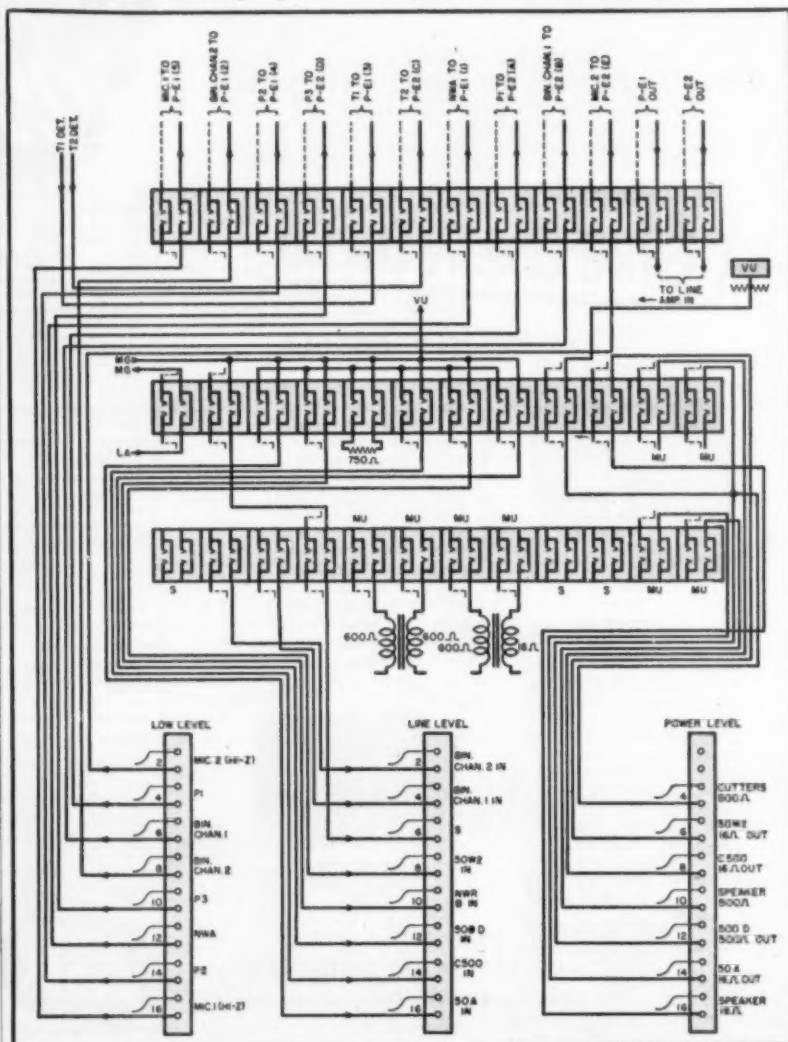
Separate pre-set gain controls are provided for the individual inputs to both of the preamps. These controls are also pre-set depending upon the

voltage available from the pickups, detector circuits, microphones, and from the tape machines. This technique of using pre-set audio levels at various points in the system makes it possible to interchange components, should breakdown occur, without upsetting the line level of the system.

The power or monitoring amplifiers are likewise provided with an input gain control. These, too, are pre-set when setting up the installation and their settings depend upon over-all gain of the respective amplifiers.

The output of each power amplifier is normalised to a fixed load. In the case of  $PA_1$  and  $PA_2$ , the termination is to a 16 ohm, 10 watt resistor while amplifier  $PA_3$  connects to a 16 ohm speaker system. This is the primary playback circuit. Amplifier  $PA_4$  is normalised to the selector switch at the turntable console and feeds either of the two magnetic cutters. A vu meter with calibrated attenuator is connected permanently at the cutters to

Fig. 10. Simplified wiring diagram of the signal circuits for components contained in the control rack. In addition, and not shown, are the relay circuits for energizing the a.c. components in the recording system.





## SPECIAL OF THE MONTH

### UTC COMMERCIAL GRADE TRANSFORMERS

Type CG, Fully Cased, Hermetically Sealed, Primary 115V 60 Cy. Secondary 750-0-750 V., **\$9.95**  
 350 MA. BRAND NEW.....Ea.  
 Type CG Choke to match, 12 Henry, **\$4.95**  
 350 MA. BRAND NEW.....Ea.

## G. E. RELAY CONTROL

(Ideal for Model Controls, Etc.)

Contains a sigma midget 8,000 ohm, relay (trips at less than 2 MA), high impedance choke, bimetal strip, neon pilot and many useful parts. The sensitive relay alone is worth much more than the total **\$1.25** Each 10 for **\$9.90**

### Panel Meters

#### NEW 50VTT SURPLUS STANDARD BRANDS

##### 2" METERS

DB meter—10 to **\$3.49**

0-500 mA DC.....3.49

##### 3" METERS

0-200 Microamps.....\$5.95

0-400 Microamps.....5.95

0-500 Microamps.....5.95

0-200 Milliamps.....4.50

0-1000 Milliamps.....4.50

0-1.5 Volts AC.....4.95

0-3 Volts AC.....4.95

##### 4" METERS

0-200 Microamps.....\$8.95

### OIL CONDENSER

#### BARGAINS

10 MFD—500 VDC \$2.95

10 MFD—600 VDC 1.75

2 MFD—1000 VDC .85

4 MFD—1500 VDC 2.50

6 MFD—1500 VDC 2.85

2 MFD—2000 VDC 2.50

4 MFD—2000 VDC 5.95

2 MFD—4000 VDC 5.95

3 MFD—4000 VDC 5.95

3 MFD—5000 VDC 5.95

3.75 mfd 600 VAC. 2.45

1 mfd 750VDC 1.75

1 12KV DC 2.95

01 5 12KV DC 2.95

5 mfd 600 VAC.....2.95

### NON-INDUCTIVE RESISTORS

Ohmite, 250 Ohm, 100 Watt. **\$59¢**

Special, 5 for \$2.50

### E. F. JOHNSON SPLIT STATOR VAR.

100 MMF. per section, .350 spacing. BRAND NEW.....Ea. **\$6.95**

### TELRAD FREQUENCY STANDARD

10 KC, 100 KC and 1000 KC output. Crystal controlled. Crystal accurate to .05%. Provision for zeroing crystal 115 V. 60 cy. operation. Complete with 4 tubes. BRAND NEW SIGNAL CORPS SURPLUS..... **\$24.75**

### BLOWER MOTOR

Survival cage, 140 CFM, 115 volt 60 cy. motor. Extremely quiet. Made by Redmond. BRAND NEW..... **\$6.95**

### G.E. PLUG-IN RELAYS

Housed in Aluminum covers. Plug into standard 3 prong sockets. SPDT, 2500 ohms D.C. for MA.....Ea. **\$2.95**

### A.C. RELAY

110 v. 60 cy. Model 50S. Cutler-Hammer SPST 15 amp. or 1/2 H.P. contacts. NEW **\$1.95** Ea.

### MOBILE DYNAMOTORS

MADE BY PIONEER AND EIGOR

6 Volts Input, 425 Volts at 375 MA Output, 6 1/2" Long, 4" Diameter. Weight 10 lbs. List Price Approx. \$70.00. BRAND NEW, ONLY..... **\$24.95**

### CARTER SUPER DYNAMOTOR

12 Volts Input, 400 V. Output @ 200 MA Continuous or 375 MA intermittent duty. Model B420. Designed for Police, Aircraft and Marine Use. Small, rugged and efficient. BRAND NEW, ONLY..... **\$24.95** Each

### CONTINENTAL MOBILE DYNAMOTORS

11 Volts Input, output 475 V. @ 210 milli..... **\$19.95** Each

### WIRE WOUND RESISTORS

Stock too long to list. We can supply most sizes, so order what you need.

10 Watts, From 1 Ohm to 70K Ohms.....Ea. **\$ .15**

20 Watts, From 4 Ohms to 50K Ohms.....Ea. **.20**

25 Watts, From 1 Ohm to 100K Ohms.....Ea. **.30**

50 Watts, From 5 Ohms to 10K Ohms.....Ea. **.40**

100 Watts, From 50 Ohms to 100K Ohms.....Ea. **.50**

### ADJUSTABLE SLIDER, WIRE WOUND

10 Watts from 1 Ohm to 10K..... **\$ .35**

25 Watts from 50 Ohms to 2.5K..... **.35**

### VACUUM CONDENSERS

50 mmf. 5 KV. General Electric..... **\$ 5.95**

100 mmf. 20 KV. Jennings..... **\$2.95**

### 1 MEGOHM, 1% W.W. PRECISION RESISTORS, SMALL CROSS

ONLY..... **97¢** Ea.; 10 for **\$8.95**

### BAKELITE CASED MICAS

MFD VDC Price MFD VDC Price MFD VDC Price

.001 500 \$ .10 .01 1 KV \$ 1.02 2 KV \$ .90

.002 500 \$ .24 .002 1200 \$ .35 .002 2500 \$ .45

.01 500 \$ .38 .004 1500 \$ .55 .004 2500 \$ .60

.02 500 \$ .58 .002 1500 \$ .75

Min. Order \$3.00—25% with Order

**PEAK ELECTRONICS CO.**

66 West Broadway, New York 7, N. Y.

Phone Worth 2-5439

## Applause Meter

(Continued from page 67)

so that an applause microphone may be placed in an advantageous position to pick up sounds from the audience. The indicating instrument is the popular "one-ma." movement. A 0-100 scale might have been preferable, although the important point is to keep it simple, since it must be easily read and interpreted, in most cases, by non-technical judges.

A schematic diagram of the meter is shown in Fig. 2.  $V_1$  and  $V_2$  are 6AU6 and 6AQ6 tubes, respectively, in a 2-stage audio amplifier, whose function is to amplify the microphone output to a suitable level for the subsequent operations. Neither cathode resistor is bypassed, since the resulting degeneration assists in keeping gain more nearly constant as the tubes age. Adequate gain is obtained without bypassing. The output of the second stage is rectified to negative d.c. by  $V_3$ , a 6AL5 connected as a shunt rectifier with both sections in parallel. The diodes of the 6AQ6 could have been used for this purpose had its cathode been grounded. The time constant of  $R_1$  and  $C_1$ , about 1 millisecond, is such that the output of the rectifier approximates the envelope of the applause.  $R_2$ ,  $R_{10}$ , and  $C_2$  form a long time constant (30 seconds) integrating network, so that the voltage at the grid of  $V_4$ , a 6C4, is approximately proportional to the integral of the energy in the handclaps over the interval of time during which the normally closed push-button  $S_1$  is held open.  $V_4$  and  $M_1$ , with their associated components, form essentially a v.t.v.m. to indicate the grid voltage of  $V_4$  without discharging  $C_2$ .  $V_5$ , the 6X5GT rectifier tube, supplies plate power for all stages, filtered by  $C_3$ ,  $R_{11}$ ,  $R_{12}$ , and  $V_6$ , a 0D3. The 0D3 also helps in holding the plate supply voltage constant in the face of fluctuating line voltage, thus keeping more nearly constant the gain of the amplifier and the balance of the v.t.v.m. bridge circuit. The balancing potentiometer  $R_{13}$  is adjusted initially to bring the meter to zero, and requires no further adjustment except to compensate for aging of the 6C4 tube.

Operation of the instrument is quite simple. After a minute or two warm-up, the needle will settle down on zero. The microphone is suspended over the audience if possible, or at least placed so as to pick up sounds from various parts of the audience as impartially as possible. During the preliminary acts, the gain control,  $R_6$ , is adjusted so that with the push-button depressed throughout each round of applause, the meter reading never exceeds full-scale. This adjustment is necessary for each program to compensate for differences in acoustics, size of audience, and mike placement. Once a satisfactory gain adjustment has been made, the control should not



GET CLEAR  
SHARP  
RECEPTION

WITH THE

NEW  
LL300

OPEN  
WIRE  
LINE

ARE YOU  
GETTING  
A GOOD  
PICTURE  
HERE?

AND  
LOSING  
IT  
BEFORE  
IT GETS  
HERE?



WRITE  
FOR FREE  
CIRCULAR

R. J. BUCHAN  
CO.

BRICLYN 1, MINN.

### 300 OHMS IMPEDANCE

This results in maximum signal transfer from antenna to set.

### EXTREMELY LOW LOSS

Air dielectric plus clear polystyrene spacers results in the lowest possible loss of signal.

### LESS NOISE PICKUP

Close spacing plus perfect impedance match results in lowest possible noise pickup.

### EASILY INSTALLED

Conventional hardware for 300 ohm ribbon lines are perfect for LL300 open wire line.

### LONG LIFE

Copperweld conductors, polystyrene spacers, plus light weight and low wind resistance result in virtually indefinite life.

### EASY TO USE SPOOLS

Packaged on 100, 150, 200, 250' convenient, easy to use spools.

If not available through your regular Jobber, order direct, immediate shipment via parcel post. Dealer cost \$4.95 per 100 feet.

PERFECT FOR  
VHF - UHF  
INSTALLATIONS

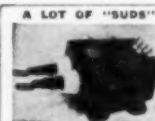


### RCA INSTITUTES, INC.

A service of Radio Corporation of America  
50 West 4th St., New York 14, N. Y.

OFFERS COURSES IN  
ALL TECHNICAL PHASES OF  
RADIO, TELEVISION, ELECTRONICS

Approved for Veterans  
Write Dept. RN-53 for Catalog



Send for our Latest Bargain Catalog.  
RELIANCE MERCHANDISING CO., Phla. 3, Pa.  
2219 Arch St.

RADIO & TELEVISION NEWS

be touched again on a given occasion, except as noted as follows. At the conclusion of each act to be judged, the button is held down as long as the applause continues, i. e., as long as the meter reading continues to increase, the final meter reading is noted, and the button is released, resetting the meter for the next act. If two or more acts receive the same applause, or if unexpected audience enthusiasm drives the meter off-scale making a reading impossible, the two or more acts receiving the most applause may be singled out for a final judgment with reduced gain on the meter.

In making measurements of applause, it is necessary that the audience restrict their expressions of enthusiasm to handclapping, since whistles and yells, being of a more continuous nature than handclaps, will cause disproportionate readings.

The net price of the parts used in this instrument amounts to \$33.93. However, most of the parts may be found in the average junk-box. The 2  $\mu$ fd. condenser,  $C_6$ , should have extremely low leakage. Even a new unit should be of good quality, and should be tested to insure that its leakage resistance is at least 200 megohms, preferably higher. Otherwise, as applause dwindles at the end of a round, the meter reading will be seen to decrease slightly instead of merely increasing more slowly, as it should.

Organizations sponsoring "talent shows" are always glad to give credit for the loan of the applause meter, so that for a relatively small investment much good-will and effective, but inoffensive, advertising results. —50—

## PICTURE OVERLOAD REDUCTION

By MILTON A. KENNEDY, JR.

**R**ECENTLY we were asked to service an RCA KCS-82 chassis with the complaint that when the outside antenna was connected to the set, the picture became overly white and the blacks became blacker, leaving hardly any fine detail. When the set was connected to a built-in antenna it worked fairly normally. Someone had previously looked at the set and had disconnected one side of the lead-in, but the customer wasn't happy with this at all.

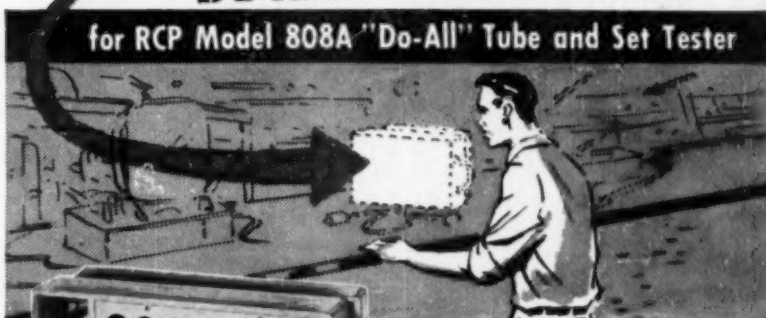
After removing the set to the shop, we discovered that none of the service-data publishers had issued information on this set since it was a new model, and the local RCA people didn't have the data either. That night I happened to be reading my July issue of **RADIO & TELEVISION NEWS**, and there was a complete schematic of that particular set.

We used this schematic the next day, but the a.g.c. seemed to be working according to the data, the plate and screen voltages were normal, and we couldn't find any defective resistors or condensers. We then decided that a little more cathode bias in the video amplifier stage would reduce the overload in this stage. Consequently, we replaced the 33-ohm cathode resistor of the 6CL6 video amplifier tube with a 100-ohm unit. This added the required cathode bias, and the set has been working well ever since. —50—

December, 1953

# SPACE RESERVED!

for RCP Model 808A "Do-All" Tube and Set Tester



Because the Radio City Products Model 808A gives you more than just the facilities of a Tube Tester. It fills the need for a TV-Radio-CR Tube Tester and VTVM—with all this extra value designed into one unit.

**Five Times Better Because It Is Five Instruments In One!**

**A TUBE TESTER**—All the features of the famous 323 Dynastrium free point tube tester—protected against obsolescence—tests all modern standard, miniature, naval base and subminiature tubes. Easily read on 4 1/2" meter.

**A CATHODE RAY TUBE TESTER**—Will check all magnetic deflection type Television Picture tubes. Locates and isolates all shorts or leaks.

**A REACTIVATOR**—Revives and Reactivates many otherwise Dim or Bad Television Picture tubes. Can also be used on other tubes.

**A VT VOLT-METER (A-C-DC)**—This really outstanding 17 Range instrument is a VT Voltmeter for AC as well as DC. Balanced bridge type push-pull circuit. Draws negligible current due to high Impedance

of 25 megohms. Accuracy  $\pm 3\%$  DC,  $\pm 5\%$  AC. Discriminator alignment scale with zero center. AC & DC volts 0 to 5-25-100-250-1000-db — 20 to 16, —6 to 30, 6 to 42, 14 to 50, 26 to 62.

**AN OHMMETER**—Reads all Resistances 0.2 ohms to 1000 megohms on 5 ranges. Use this instrument also to check condensers for leakage and shorts.

Equipped with a double rollindex and enlarged, easy to read letters and numbers, the new RCP 808A is so designed as to simplify each operation. Truly a professional instrument for the professional technician.

The RCP 808A is housed in a handsome hand-rubbed oak carrying case and features an attractive, highly visual panel. Compartment available to hold test leads, isolation probe, batteries, etc. Size 12 1/2" x 12 1/2" x 4 1/2". Weight 12 lbs. Complete, ready to operate at. **\$99.95**

Understand why so many servicemen agree that RCP is The Best For Test. Ask your local distributor for a copy of the latest Radio City Products Catalogue or write to us, in care of Dept. RN12

**RADIO CITY PRODUCTS CO., INC.**

152 WEST 25th STREET • NEW YORK 1, N. Y.



## WE ARE QUICK AND CASH BUYERS

We're looking for surplus inventories of all types of electronic parts—receiving, transmitting and special-purpose Tubes. Anything in the Radio, TV and electronic field.

**SMALL OR LARGE QUANTITIES—SEND US YOUR LIST**  
Submit samples where possible, amount of each item and prices.

**NAT ADELMAN**  
168 Washington St. New York 6, N. Y.

## ELECTRONIC HOBBYISTS

Build and play my latest polyphonic organ without a knowledge of music. Or get blueprints for a miniature electronic brain, and other projects. Send 3c stamp for air mail reply.

**JIM KIRK, W6DEG**

1552 Church St. San Francisco 14, Calif.

# WANTED

**WE NEED YOUR SURPLUS ELECTRONIC EQUIPMENT**

**WE PAY TOP \$\$\$ FOR:**

- ★ RADIO RECEIVERS
- ★ TRANSmitters
- ★ ARC-1
- ★ ARC-3
- ★ ART-13
- ★ CONTROL BOXES
- ★ INDICATORS
- ★ CLAMPS
- ★ PLUGS
- ★ COILS
- ★ RELAYS
- ★ TELEPHONE MATERIALS
- ★ AM CONNECTORS
- ★ WE BUY ANYTHING!

Write, Wire today! Tell us what you have.

**TALLEN CO., Inc., Dept. RN**  
159 Carlton Ave., Brooklyn 5, N. Y.

## THE SYMBOL OF QUALITY

## in TRANSFORMERS



## QUALITY

*you can see!*

"Beauty is only skin deep," but the distinctive appearance of Triad Transformers is an outward evidence of inner quality, more than simply good looks.

Brilliant design, fine materials, precision manufacturing techniques and skilled craftsmanship contribute to the end result, which looks like—and is—the finest transformer made.

Triad Transformers are sold by principal jobbers in leading cities.

Write for Catalogs TR-53A & TV-53A.



2255 Redwood Ave., Venice, California

## Jam-Jar Rectifier (Continued from page 61)

the electrodes, it is possible nowadays to use an aluminum-tubing cathode. The cathode then doubles as the container, reducing size and helping to dissipate heat.

The number of cells is determined by the voltage and by the circuit. Fig. 1 shows possible connections. The half-wave connection (Fig. 1A) is not very useful—the output is rough and the regulation bad. Fig. 1B is the full-wave circuit using a center-tapped transformer. Fig. 1C is the bridge connection used for the supply described herein. In all cases, the cells will stand a back e.m.f. of about 80 volts, and the current which can be drawn depends upon anode area. The dimensions given permit a 50-ma. drain.

For construction, one-inch aluminum tubing is the main ingredient. As shown in the illustration, it is cut into 5" lengths with a tubing cutter. Four 5" pieces are also cut from a coat hanger, and the paint sanded off. Clean the iron and the aluminum in strong hot detergent, then rinse.

A cork is driven into one end of each tube. A #33 hole is drilled 1/4" from the other end, and tapped for a 6-32 terminal screw.

A 6" length of "2 x 4" lumber makes a good holder. One-inch holes are bored in the wood, 1" deep, and the tubes slipped into place.

The iron electrodes, with plastic spacers attached, are put in the cells; and the bridge wired according to Fig. 1C. A 4-terminal strip is used for external connections.

The solution is made by stirring household borax into one-half pint of hot water until no more dissolves. When the mixture cools, each cell should be filled to within one-quarter inch of the top.

The oxide coating is formed by connecting the rectifier to 117 volts a.c., with a 100-watt lamp in series to limit the current. Almost immediately, a slight d.c. voltage should appear at the output terminals. "Gassing" is normal, but if the cells boil, turn off the input for a few minutes.

At first, the lamp will burn brightly, but as the cathodes form it will dim, and finally almost go out. Forming should take less than half an hour.

If it is desired to use the 4-cell bank for continuous duty from line voltage, the lamp can be left in the circuit, to hold input to about 80 volts.

To make rectifiers suitable for higher voltage, add cells in multiples of four as shown in Fig. 1D, until they stay cool with no load. Don't be afraid to sock on the voltage! A 48-cell bank is good for about 1000 volts. Just add water to make up for evaporation, and don't drop things into the cells.

When forming a large bank, it is best to break it into groups of 4 cells, forming them on 117 volts before making the final bridge connection, in

## Xmas Xtra Values!

Pipe the prices—feast yer eyes!  
Nobody beats COLUMBIA'S buys!

APS-13 "Tail End Charley" TRANSCIVER  
420 MC. UHF, 3 stages of 30 MC. IF amplifier. Complete R.F. Section, but less tubes & dynamotor. Good condition. \$4.95

**TUBES! NEW! BOXED! 19c EACH!**  
1225 1629 65H7 6N6 954  
7193 371 801 8F7 813  
Many more! Minimum order 10 tubes.

MINIATURE 6 V. WET CELL BATTERY, With 6 V. rev. DC motor. F.M. for R.C. boat. 3 1/2" x 3 1/2" x 1 1/2". Battery less motor... \$1.49 With motor... \$2.99

**SLASH/PRICED TUBES—NEW, BOXED!**  
5BP4... \$2.98 6L6... \$1.49 6AK5... \$1.49  
5BP1... \$4.49 6AC7... \$2.73 6X4... \$2.99  
150,000 Assorted Tubes—Make Your Own Prices!

## CRYSTALS!

**DUMONT 3" Oscillograph** Model 164-E. With sweep circuit. Good cond. \$19.95  
SET OF 80 CRYSTALS: PT-241 for SSB, lattice filter, 54th harmonic. From 370-218 KC. Includes the 500 Kc. crystal. Set of 80 reg. \$12.50 value. ONLY \$9.95  
SET OF 120 CRYSTALS: 72nd harmonic. From 370-218 Kc. Includes 500 Kc. crystal. Set of 120 regular \$19.95 value. ONLY \$14.95  
ASSORTED CRYSTALS: (Each 500 and 500 Kc.) \$1.35 10 for \$13.50  
200 Kc. CRYSTAL... \$1.75 500 Kc. CRYSTAL... 75c

**NOTE: No Warranty on Crystals**  
HEAD AND CHEST SETS: Mono-mono covers. Light weight. Each... \$3.50 PER PAIR ONLY... \$6.95

## DYNAMOTORS

PE-73: 24 V. in. 1,000 V. @ 350 mls. out. A HOT buy \$1... \$3.99  
BD-83: 12 V. in. 375 V. @ 150 mls. out. Terrific at only... \$5.95

RL-43 REVERSIBLE ANTENNA MOTOR: With reel, clutch and gear box. Like new... \$2.49  
T-17 MIRE, Like new. Each... \$1.50  
ARR-1 RECEIVER: For conversion to 320 MC. With schematic. See Jan. 49 Radio News for conversion. Good condition. ONLY... \$9.99

## SUPREME MODEL 600

### Illuminated TUBE & SET TESTER

Tests all latest tubes. Seven in multi-tester tests DC 0-2,500 V. in 7 ranges. AC 0-2,500 V. in 6 ranges. DC current 7 ranges: 0-1,000 microamps, 0-1,000 ma., and 0-10 amps. Output meter 3 ranges: 0-20 megohms. Output meter and battery tester with test leads and batteries under load. Comes with test leads and gray metal Hammerlock case. Size: 11x15x6 1/4 in. Factory guarantee includes 1 year of free tube setting service. BRAND NEW IN ORIGINAL BOXES! You know this set is designed to sell for \$117.50. While they last, our price—the country's lowest, only... \$59.50

PE-104 VIBRATOR SUPPLY. Part of DC-554. Trans. Rec. 6 or 12 V. input. Output positive: 6, 14 and 84 VDC; negative: 1.4, 6, 12, 51 VDC. New with spare parts... \$9.95

## COLUMBIA'S XMAS GIFT TO YOU!

SCR-183 12 V. RECEIVER & TRANSMITTER! Covers aircraft, marine and ham bands! Complete with 3 control knobs, tuning head, flex-coupler, rack and shock mount! Plus 12 V. Dynamotor! Individual parts worth \$23.35. Approx. \$35.00 output. EXCEL. COND., COMPLETE! Plus schematic. Never before sold at this seasonally low price... \$10.95

## ARC-5 OR 274-N TRANSMITTERS

All pre-tested & guaranteed!  
2-1-3 mcs. Brand new... \$19.95  
3-4 mcs. With tubes... 25.00  
4-5-3 mcs. With tubes... 8.95  
5-3-7 mcs. With tubes... 14.50  
7-9-1 With tubes... 14.50  
7-23/ARC-5 VHF TRANSMITTER For C.A.P. with tubes 100-150 MC. Crystal control... 29.95

## ARC-5 OR 274-N RECEIVERS

Equipped with Tuning Knobs  
19-55 kc... \$19.95  
1-5-3 mcs. Like new... 24.90  
3-6 mcs. Brand new... 24.90  
3-6 mcs. With tubes... 10.95  
6-9-1 mcs. With tubes. Used... 22.90  
6-9-1 mcs. Used. Less tubes... 6.95  
RC-25 274-N Modulator motor, Excel. cond... 3.95  
12 V. COMMAND RECEIVER DYNAMOTOR, New... 12.95  
Plus All Accessories Needed for Above. Conversion done available on request.

Write Today—and ask for FREE CATALOGUE!  
All orders F.O.B. Los Angeles, 25% deposit required. All items subject to prior sale.

## COLUMBIA ELECTRONIC SALES

2251-53 W. Washington Blvd., Los Angeles 21, Calif.  
Come in and visit our new, larger centrally located warehouse store!

## STANDARD BRAND TUBES BOXED

Most Types Are JANS and Fully GUARANTEED  
1A6... 1.05 6AH6... 1.17 6SN7GT... .70  
1A7GT... .75 6AK5... .95 6V6GT... .95  
1B6... .85 6AL5... .85 6X4... .72  
1C5GT... .70 6AQ5... .60 6Y6G... .93  
1E1GT... 1.10 6AT8... .75  
1L4... .56 6AU6... .69 7C4... .72  
1L6... .80 6AV6... .55 7C5... .69  
1B7... .80 6BE6... .75 7C7... .72  
1B8... .65 6BE6GT... 1.82 7E5... .65  
1B9... .65 6BE6GT... 1.25 7F7... .72  
1T4... .65 6BZ7... 1.25 7Q7... .65  
1U4... .65 6C4... .55 7H7... .79  
1V4... .65 6C5... .75 7V7... .79  
2A3... 1.10 6C6B... .65 7W7... .95  
2A4... .65 6J8... .30 12A6... .65  
3A4... .65 6J8... .30 12A7... .65  
3A5... .65 6J8... .30 12A7... .65  
3B7... .65 6J7... .75 12AU7... .72  
3D6... .65 6K6GT... .95 12BA7... .69  
3D7... .65 6L6-6A... .75 12C7... .72  
3E4... .65 6L7... .80 12SF5... .75  
3E7... .65 6L7... .80 12SF7... .75  
3E8... .65 6L7... .80 12SL7GT... .63  
6A7... .65 6SH7... .65 12SR7... .72  
6AB... .65 6J7... .75 12SL7GT... .63  
6AC7... .75 6SK7... .95 35Z5GT... .45  
6AB... .65 6SL7GT... .75 35Z5GT... .45  
CRYSTAL DIODES—1N23B, 2.75. Minimum order, 5.00. Enclose full remittance. We pay parcel post charges.  
ALLIED ELECTRONIC SALES, Dept. C  
74 Cortlandt St., New York 7, N. Y. BARCLAY 7-5839

order not to overload the power transformer.

You will find that the "slop rectifier" has a unique quality that has helped many a ham. Once in awhile a wire will get in the wrong place, and the modern high-efficiency "a.c. straighteners" take the road "west" with more seat than a Hollywood Hotrod. But with a rack full of purring "slop" cells, all that happens when you drop the screwdriver across the "B-plus" is a buzz and a few bubbles.

You can't hurt this old-timer! —(30)—

## CALIBRATION CIRCUIT

By WILBUR J. HANTZ

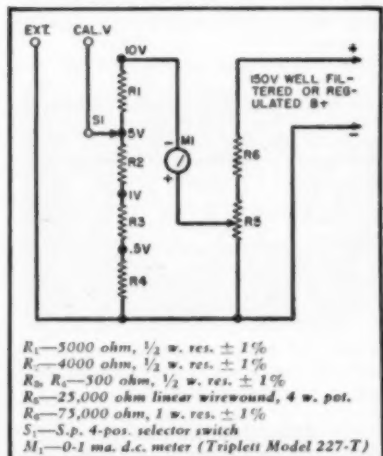
IF YOU ever have a need for some source of accurate small d.c. voltages for calibrating purposes, this circuit should fill the bill. It was originally designed for a Brush BL-360 strain gauge amplifier as a source of d.c. voltages for calibrating the d.c. amplifier. (The Brush Development Company apparently overlooked this necessity when the d.c. amplifier is used independently of the a.c. bridge amplifier.)

The meter range multipliers  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are also used as a voltage divider to provide 10 volts, 5 volts, 1 volt and .5 volt external calibration voltages selected by the range switch. The Triplett model 227 meter has an internal resistance of 33 ohms and this value is small enough to be disregarded. With the resistance values shown, and using a 150-volt supply,  $R_1$  is adjusted for full-scale meter reading, or 1 ma. through the voltage divider string. This provides 10 volts across the divider.

To avoid faulty adjustment of  $R_1$ , the meter calibration pot, this control should preferably be of the short-shaft screwdriver slot type and with a locknut if possible.

Do not load the external calibrating voltage output with anything less than 500,000 ohms or the unit will be in error. This circuit should come in handy as a calibrating source for v.t.v.m.'s or oscilloscopes. Other than a 150-volt supply can be used but then  $R_1$  and  $R_2$  would have to be changed accordingly. Due to the very small current drain of the unit, any external instrument can supply it.

Circuit for providing small d.c. voltages.



You can certainly hint hard enough—telling everybody a Weller Soldering Gun tops your "want" list because it makes all kinds of jobs easier, neater, faster and better. So if you don't get one, it's because the old guy kept it for sled repairs and his toy factory. Even around the North Pole, there are endless uses for the new, improved Weller Soldering Guns!



While you're thinking about it—they're a sure-fire idea for giving, too!

- **FOUR NEW MODELS**—capacities from 100 to 275 watts!
- **INSTANT HEAT**—no waiting, no wasted current.
- **TWO SPOTLIGHTS**—eliminate shadows.
- **DUAL HEAT**—for extra power.
- **VERSATILE**—special tips for soldering, cutting, smoothing.
- **GIFT-PACKED** for Christmas, now at your radio and electronic parts Distributor —from \$8.95 net.

BETTER FROM GRIP TO TIP



**Weller SOLDERING GUNS**

810 Packer Street, Easton, Pa.

## BARGAINS YOU'VE NEVER SEEN BEFORE

GROUND PLANE ANTENNAS: 10-20-40 Meters—easily made with our pointed-copper-plated WELPER, chrome-plated tapered sections—16 ft. \$2.45; 32 ft. \$3.25.	
NEW BLENDED RECTIFIERS—Heavy Type	
Capacity 1 Amp 2 A. 5 A. 10 A. 20 A.	
2-18 Volts \$1.25 \$2.20 \$4.50 \$6.75 \$12.25	
24-36 Volts 2.18 3.60 6.50 12.75 25.50	
90-130 Volts 7.50 10.50 29.75 44.95 79.50	
METAL CABINET—13 1/2" x 29 1/2" x 10 1/2" steel. \$0.75	
JUKEBOX CHROME SPEAKER Enclosure w. 5" Speaker \$1.95	
METERS—2 1/2" 0-1 Ma. \$3.75; 200 micro. \$3.45	
CRYSTAL—27.255 Mc.—Petersen 29A \$4.75	
SPECIAL—Guaranteed TUBES	
RK-61... \$3.45 XFG-1... \$3.35 3DG... \$0.95	
RADIO CONTROL EQUIPMENT	
TRANSMITTER & RECEIVER KIT—License Free. \$9.95	
All parts & diagrams less tubes & crystals to build 5 Watt Transmitter Unit & 2 Tube Heavyweight Receiver, including SIGMA 10,000 ohm Relay.	
COMPLETE RADIO CONTROL OUTPUT—Arctrol TRANSMITTER, Boomerang RECEIVER & EQUIPMENT (less Batts.) \$57.50	
RELAYS—SIGMA 4P, 8,000 ohm, 1 Ma. SPDT. \$4.50	
KURMAN BK-35 11,000 ohm, 1/2 Ma. SPDT. \$4.25	
SIGMA SP, Caned—Dual 100 ohm, 110-0 Volts Western Electric POLAR Relay—D163119A—SPDT \$4.25	
LEACH 102-50N: 24 Volt, heavy duty DPST-NC. \$1.85	
GM-2 Volt dual coil, heavy contact DPST. \$2.05	
GM-10,000 ohm coil, heavy DPST-NC. \$4.45	
GM-Dual coil 85 ohms, heavy 2 Bk + 1 MK. \$2.75	
STRUTHERS type—5000 ohm coil—2 Dbl. Mk + SPST \$1.95	
KITS—All Kits include diagram	
MULTIMETER KIT—Basic parts to build 1000 ohm 3 Ma. 0-60,000 Volts & Continuity \$3.15	
RF PROBE KIT—30 Mc. scope, Sig. Tracer, VTM \$2.45	
VIBRATOR TRANSFORMER—Standard 6 Volt type \$0.95	
CASED TRANSFORMERS	
Pri 115V/Sec 600 VCT 175 Ma. 5V. 5A. \$5.95	
6.3V 435A \$5.95	
Pri 216-224V 50-60 cycle Sec 5V CT 221A 1Amps \$6.95	
Pri 220V 50-60 cycle Sec 10V 10A; 10.5V 10A; 10.2V 5A; 128V 2.8A; 128V 7A \$6.45	
CAPED FILTER CHOKES—100-200Ma—90 Ohm \$3.25	
1.0 Henry—1 Amp—11 ohms—\$9.95	
1.0H-125 Ma \$1.95	
DYNAMOTORS—6 V Input 100 Volts @ 165 Ma. \$9.50	
6V Imp/180V-100 Ma. \$7.95; 12V Imp/600V 200 Ma. \$9.50	
STORAGE BATTERIES—2 Volt 375mA \$2.75	
MINIATURE & W-willing NTC—21415 \$2.45	
BATTERY CHARGER: 2-6 Volts 6 A. with Ind. color \$7.95	
CHARGER for REAR AID & Port. 115-00 Volts. \$4.50	
1/2 HP MOTOR—12 1/2 Volts DC—OK for 6 Volts. \$5.25	
1 1/2 Volt Tiny MOTOR, 6000 RPM with dble shaft \$1.75	
ABOVE MOTOR with VARIABLE SPEED GEAR BOX \$3.45	
GEAR BOX—300/1 ratio 2 1/2" DR 3"—up to 5000 RPM \$1.45	
NAYDON SYNCHRO MOTOR—40 Cycle 24 Volts—Character 115V AC with series condenser—3RPH \$1.35	
ALLEN-BRADLEY 3/4" POT: 2500 ohms—4 Watt \$1.75	
POWER POTENTIOMETERS: 25000 ohms—4 Watt 400 Watt Ward Leonard 1000 ohm POT—w knob. 95c	
D.P.D.T. TELEPHONE type SWITCH \$2.00	
FILTRETTE TUBE 1125, 3 Amperes \$2.00	
Oil CAPACITOR—CAPAL: 1/2 MF 200V Tubular 25c	
FULL STOCK OF JAN-C-35 CAPACITORS—IMMED. DEL. Tremendous stock of oil and transmitting mica capacitors at rock bottom prices. Send requirements.	
ALL MATERIAL GUARANTEED. FREE CATALOG "N" FREE—with order of \$10.00 or more, choice of Sensitive 10,000 ohm Relay, new DC-300 or Ball Pen	
GYRO ELECTRONICS CO. Worth 6-1290	
325 CANAL ST. NEW YORK 13, N. Y.	

## A New Idea

in High Fidelity  
Sound Reproduction



## Shields ULTRA-LOADING SPEAKER SYSTEM

Scientifically constructed to give maximum sound quality. Extremely versatile, the unit is portable and weighs only 27 lbs. Dimensions: 36" high, 19" deep, 9" wide.



Available with blonde or mahogany finish.

With addition of legs, it serves as a cocktail table.

GET  
THE  
FACTS

MAIL COUPON TODAY

Shields Laboratories, Inc.

Please send me your bulletin on the new Shields Ultra-Loading Speaker System.

NAME .....

ADDRESS .....

CITY .....

STATE .....

RTVN-123

**Shields** LABORATORIES, INC.

810 N. LINCOLN AVENUE  
PITTSBURGH 12, PA.

# NEW TV PRODUCTS on the Market.....

### "ROTAXIAL" CABLES

U.S. Wire and Cable Corp., Progress & Monroe Streets, Union, N. J. has developed a new cable which has been designed especially for community television systems.

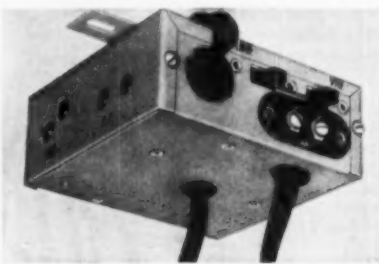
The "Rotaxial" cables are constructed to provide low radiation losses and consistent peak performance over the entire v.h.f. range. The cables are available with either double braid and single jacket or double braid and double jackets.

For engineering advice and application data write the company direct.

### MULTI-CHANNEL CONVERTER

Crest Laboratories, Rockaway Beach, New York has introduced a multi-channel converter which has been especially designed for single channel use. Easily tunable to receive any channel, within a 20 channel range, without instruments, the new unit features silver-plated, high "Q" tuned circuits to provide high gain and sensitivity.

A fundamental oscillator provides good oscillator stability and reduces susceptibility to interference. The con-



verter is designed to be used with a 300-ohm u.h.f. antenna.

### SCREEN TISSUES

Carhoff Company, 11706 Kinsman Road, Cleveland, Ohio has developed a "giant-size" cleaning tissue which is especially effective for cleaning television screens or masks whether glass or plastic.

The tissues, chemically treated, are strong, soft, and durable. Each tissue can be used several times. They will clean grease and grime from glass as well as prevent fogging.

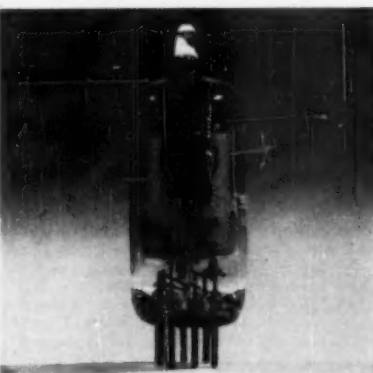
### NEW TV TUBE

Sylvania Electric Products Inc. has announced the development of a new tube, the Type 6CS6, designed for combined sync separator and noise suppressor use.

The new tube is designed to be used in circuits that accomplish sync separation by feeding the video signal extending in a positive direction to grid

three where the negative grid leak bias development automatically adjusts the clipping level.

Noise suppression is obtained in the 6CS6 by applying a video signal extending in a negative direction to grid



one. Strong noise impulses will cause tube cut-off momentarily and thus reduce the harmful effects of noise on picture tube sweep circuits.

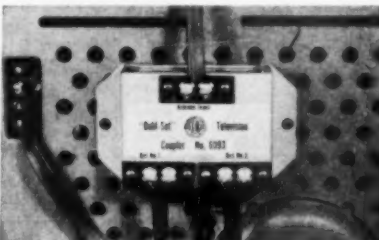
The 6CS6 grid number three has a sharp cut-off characteristic to facilitate the clipping action which removes picture information from the sync pulses. The tube is in the T-5½ bulb style and has a 6.3 volt heater.

### ANTENNA COUPLERS

Insuline Corporation of America, 3602 35th Avenue, Long Island City 1, N. Y. has added two new antenna couplers to its line.

Designed to permit the use of more than one television receiver from a single antenna, the new couplers are the No. 6093 "Dubl-Set" and the No. 6094 "Multi-Set." The first allows two receivers to be operated from an antenna while the latter will permit as many as four sets to function simultaneously.

There is no interaction between re-



ceivers and no loss in signal strength when the couplers are employed, according to the company.

### REPLACEMENT PARTS

The Tube Department of Radio Corporation of America, Harrison, N. J.  
RADIO & TELEVISION NEWS

has announced the availability of two new electronic deflecting components which have been engineered for use with 90 degree, 27" television picture tubes.

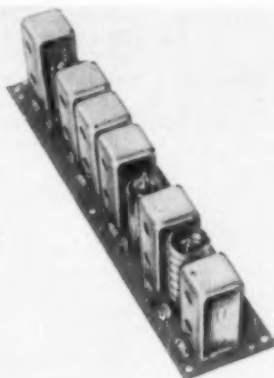
Now available for replacement applications are a magnetic deflection yoke (RCA-219D1) and a horizontal-output and high-voltage transformer (RCA-235T1). Although the yoke and transformer can be employed as independent units, they are designed for complementary operation. When used together, a proper impedance match is effected between the horizontal winding of the yoke and the horizontal output tube insuring ample deflection, good sweep linearity, and good voltage regulation.

These replacement parts are currently available at the company's regular distributors.

#### I.F. AMPLIFIER

The Tube Department of Radio Corporation of America, Harrison, N. J. has announced the availability of a new, assembled, and aligned i.f. amplifier, the RCA-208E1.

Complete with tubes and designed for use in TV receivers utilizing intercarrier sound systems having picture i.f. and sound i.f. carriers of 45.75 mc. and 41.25 mc. respectively, the new unit features high gain, full 4 mc. bandpass response, and excellent skirt selectivity. It provides an over-all



sensitivity of approximately 40 microvolts at 44 mc. and accurate control of the response-curve shape.

When used in conjunction with a cascade-type tuner, a voltage of only 6.5 microvolts (midband) is required at the input of the tuner to provide a d.c. voltage increase of 1 volt at the output of the amplifier.

A technical bulletin covering the RCA-208E1 is available on request.

#### LEAD-IN WEATHERHEAD

Javez, P.O. Box 646, Redlands, California has announced the availability of a new television lead-in weatherhead which has been trade-named "Tenna-Shingle."

Molded of acrylic resin, the new unit fits under shingles on a roof or under the siding and covers the small hole required for the lead-in. The unit is transparent and takes on the color

December, 1953

# The Latest and Best in TV ANTENNAS AND ACCESSORIES from Admiral

**World's Largest  
Television Manufacturer**



Admiral is first with the best and the mostest. Your Admiral distributor now carries the most complete and up-to-the-minute line of TV antennas and accessories. See the Admiral Catalog for high-gain UHF antennas of the most advanced design . . . rotators . . . all-weather transmission line . . . mast and tower equipment for every type of installation.

Now you can get everything needed from one source, at one time . . . no need to waste time shopping around. Quick, close-to-home service. Admiral prices are lowest. And every item conforms to Admiral's high quality standards. Send for your catalog today!

**FREE**  
Mail coupon for  
**Admiral**  
CATALOG

**Admiral Corporation, Accessories Division**  
3800 Cortland St., Chicago 47, Illinois  
Please send free catalog.

Name

Address

City  State

RT-12

**20,000 OIL FILLED CONDENSERS**  
Sprague and Solar .1 Mfd. 300 V.

**LOT PRICE .03 each**

Inquire for smaller quantity price

**J. S. H. SALES CO.**

7552 Melrose Ave. Los Angeles 46, Calif.

**BARGAIN HUNTING?** **RADIO SERVICEMEN!**

Write for SENSATIONAL CATALOG  
**HENSHAW RADIO SUPPLY**  
3619 TROOST KANSAS CITY, MO.

## EASY TO LEARN CODE

It is easy to learn or increase speed with an Instructograph Code Teacher. Affords the quickest and most practical method yet developed. For beginners or advanced students. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready-to QRM.

**ENDORSED BY THOUSANDS!**

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for convenient rental and purchase plans.

**INSTRUCTOGRAPH COMPANY**

4711 SHERIDAN ROAD, CHICAGO 46, ILLINOIS





figure of the UCT-1 has been reduced to only 13 db, which produces an improvement in reception roughly equivalent to quadrupling the transmitter power.

The new model is easily installed by connection to the antenna input of a standard v.h.f. receiver. The unit is housed in a brown plastic cabinet which is placed on top of the set.

The company will provide full details on request.

#### TELE-MATIC U.H.F. BOOSTER

Tele-Matic Industries, Inc., 1 Jorammon St., Brooklyn 1, N. Y. has developed and is in production on a u.h.f. booster, the Model UH-14-83.

The new booster provides improved TV pictures in areas where reception is poor, according to the company. The



gain of the unit is 14 db which is more than enough to minimize the noise figure of the converter. The complete absence of sliding contacts eliminates tuning noise. The bandwidth of 5-12 mc. is wide enough for full reproduction of both picture and sound details, but narrow enough for the complete rejection of spurious signals.

#### V.H.F. COUPLER

Technical Appliance Corporation of Sherburne, N. Y. has announced the availability of a new v.h.f. antenna coupling device which permits good impedance matching and maximum signal transfer.

The Taco No. 1425 v.h.f. "Magi-Mix" is enclosed in a plastic housing with straps attached for quick positive mounting. Newly developed electronic circuitry comprises standard electronic components to insure efficiency. The unit is not adversely affected by moisture or the elements.

The unit is designed to be used with broadband yagis. It may be employed in any combination of high- and low-band antennas to feed a single transmission line to the receiver, thus eliminating separate transmission lines and switching devices.

#### U.H.F. BOOSTER

Industrial Television, Inc., 369 Lexington Ave., Clifton, N. J. is now marketing its 133 u.h.f. "Autobooster" which covers the entire u.h.f. band.

Utilizing the newly-developed 6AJ4 low-noise u.h.f. triode, the new booster is, in reality, a continuously tunable amplifier.

Further details on this new product are available from the company's distributors or the company direct. —50—

December, 1953

Only 10% Down...18 Months to Pay!

## hallicrafters

I can SAVE you money... Liberal Trade-ins



S-76 RECEIVER... \$199.95

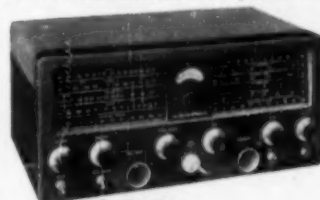
SX-71 RECEIVER... \$249.95



**\$20. Cash Down**

\$15.90 per month — 12 months  
\$10.90 per month — 18 months

Extra selectivity with double superheterodyne circuit. One RF, two conversion and 3 IF stages. Range 550-1550 Kc, 1.7-34 Mc in four bands. 8 tubes plus voltage regulator and rectifier. Complete with tubes, less speaker.



**\$25. Cash Down**

\$19.87 per month — 12 months  
\$13.63 per month — 18 months

Double Conversion sharp selectivity, plus built-in NBFM at moderate cost. 11 tubes plus voltage regulator and rectifier. Low down payment.

#### HALLICRAFTERS RECEIVERS AVAILABLE FOR IMMEDIATE SHIPMENT

MODEL NUMBER	DOWN PAYMENT	CASH PRICE	MODEL NUMBER	DOWN PAYMENT	CASH PRICE	MODEL NUMBER	DOWN PAYMENT	CASH PRICE
S-81.....	\$ 6.00	\$59.95	S-40B.....	\$13.00	\$129.95	ST-83.....	\$13.00	\$129.95
S-82.....	\$ 6.00	\$59.95	S-53A.....	\$10.00	\$ 99.95	S-78A.....	\$ 8.95	\$ 89.50
A-84.....	\$10.00	\$99.50	S-72L.....	\$12.00	\$119.95	SX-62.....	\$35.00	\$349.95
S-38C.....	\$ 6.00	\$59.95	S-77A.....	\$13.00	\$129.95	S-72 Part.....	\$11.00	\$109.95
R-46 Speak.	\$ 2.50	\$24.95	HT-20 XMTR	\$44.95	\$449.50	SX-88 Rec.	\$50.00	\$499.95



### JUST OFF THE PRESS!

Big New WRL 1954 Catalog

Offering the greatest selection of radio & television equipment, parts, and supplies, from "The World's Largest Distributor of Amateur Radio Transmitting Equipment." Order with confidence from "WRL—the world's most personalized radio supply house."

Send for **FREE** Copy

WRITE—WIRE  
PHONE 2-0277

WORLD RADIO LABORATORIES  
744 West Broadway  
Council Bluffs, Iowa

R-12

Please send me:

- ☐ Radio Map 25¢ ☐ WRL XMTR info  
☐ New Catalog ☐ SX-71 info  
☐ Used Equipment List ☐ S-76 info  
☐ New Log Book 25¢

Name .....

Address .....

City..... State.....

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (TITLE 39, UNITED STATES CODE, SECTION 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF Radio & Television News, published monthly at Chicago, Illinois, for October 1, 1953.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Ziff-Davis Publishing Company, 64 East Lake St., Chicago 1, Ill.; Editor, Oliver Bend, 366 Madison Ave., New York 17, N. Y.; Managing editor, Wm. A. Stocklin, 366 Madison Ave., New York 17, N. Y.; Business manager, G. E. Carney, 366 Madison Ave., New York 17, N. Y.

2. The owner is: Ziff-Davis Publishing Company, 64 East Lake St., Chicago 1, Ill.; William B. Ziff, 64 East Lake St., Chicago 1, Ill.; B. G. Davis, 64 East Lake St., Chicago 1, Ill.; A. Ziff, 64 East Lake St., Chicago 1, Ill.; S. Davis, 64 East Lake St., Chicago 1, Ill.

3. The known bondholders, mortgages, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities are: Modern Woodmen of America, Rock Island, Illinois.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

G. E. CARNEY, Business Manager.

Sworn to and subscribed before me this 24th day of September, 1953.

[SEAL]

(My commission expires March 30, 1955.)

Helen Bullock, Notary Public.

# BUILD 15 RADIOS

AT HOME ONLY

With the New Improved 1954 **\$19<sup>95</sup>**  
Progressive Radio "EDU-KIT"

NOW INCLUDES  
SIGNAL TRACER  
and  
CODE OSCILLATOR

- FREE TOOLS WITH KIT
- ABSOLUTELY NO KNOWLEDGE OF RADIO NECESSARY
- NO ADDITIONAL PARTS NEEDED
- EXCELLENT BACKGROUND FOR TELEVISION
- 10-DAY MONEY-BACK GUARANTEE

## WHAT THE PROGRESSIVE RADIO "EDU-KIT" OFFERS YOU

The "Edu-Kit" offers you a Home Radio Technician Course at a rock-bottom price. You will learn how to identify Radio Symbols and Diagrams; how to build radios, using regular radio schematics; how to wire and solder in a professional manner. You will learn how to operate Receivers, Transmitters, and Audio Amplifiers. You will learn how to service and trouble-shoot radios. You will learn code. You will receive training for F.C.C. license. In brief, you will receive a basic education in Radio exactly like the kind you would expect to receive in a Radio Course costing several hundred dollars.

### THE KIT FOR EVERYONE

It is not necessary that you have even the slightest background in science or radio. The "Edu-Kit" is used by young and old; by radio schools and clubs; by Armed Forces personnel and veterans for training and rehabilitation. No instructor is required. Instructions are complete, simple and clear. You cannot make a mistake.

### PROGRESSIVE TEACHING METHOD

The "Edu-Kit" uses the principle of "Learn by Doing." Therefore you will build radios, perform jobs, and conduct experiments to illustrate the principles which you learn. You begin by learning the function and theory of each of the radio parts. Then you build a simple radio. Gradually in a progressive manner, you will find yourself constructing more advanced multi-tube radio sets, and doing work like a professional Radio Technician. The "Edu-Kit" instruction books are exceedingly clear in their explanations, photographs and diagrams. These sets operate on 100-125 V. AC-DC.

### The Progressive Radio "EDU-KIT" Is Complete

You will receive every part necessary to build fifteen different radio sets. Our kits contain tubes, tube sockets, chassis, variable condensers, electrolytic condensers, mica condensers, paper condensers, resistors, line cords, selenium rectifiers, tie strips, coils, hardware, tubing, etc. Tools are included, as well as an Electrical and Radio Tester. Complete, easy-to-follow instructions are provided. In addition, the "Edu-Kit" now contains lessons for servicing with the Progressive Signal Tracer, F.C.C. instructions, quizzes. The "Edu-Kit" is a complete radio course, down to the smallest detail.

### TROUBLE-SHOOTING LESSONS

Trouble-shooting and servicing are included. You will be taught to recognize and repair troubles. You will build and learn to operate a professional Signal Tracer. You receive an Electrical and Radio Tester, and learn to use it for radio repairs. While you are learning in this practical way, you will be able to do many a repair job for your neighbors and friends and charge fees which will far exceed the cost of the "Edu-Kit." Our Consultation Service will help you with any technical problems which you may have.

### FREE EXTRAS

- Electrical and Radio Tester • Electric Soldering Iron • Bridge on Television • Radio Trouble-Shooting Guide • Membership in Radio-Television Club • Consultation Service • Quizzes • Training for F.C.C. License.

### MAIL TODAY Your Order Shipped Same Day Received

Send me the "Edu-Kit" with Money-back Guarantee—Include All FREE extras.

- ☐ Check or M.O. enclosed—postage prepaid
- ☐ C.O.D. (U. S. Only)—I will pay postage
- ☐ Send further information

Outside U.S.A.—No C.O.D.'s; send check on U.S. bank or international M.O. for \$19.95. Postage prepaid.

"Edu-Kit" for \$19.95. U.S. AC-DC \$22.45.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

**PROGRESSIVE "EDU-KITS" INC.**

497 Union Ave., Dept. RN-25, Brooklyn 11, N. Y.

## Spot Radio News (Continued from page 18)

The studios of WIP served as the meeting place, with Benedict Gimbel, Jr., as host. In welcoming the broadcasters, he said that sincere interest in this form of telecasting was more than evident by the attendance of so many broadcasters.

An optimistic note to the station owners, who are seeking financial aid through this new type of telecasting, was sounded by James M. Landis, former dean of the Harvard Law School, and special counsel for Skiatron, a subscription-TV service. The legal specialist emphasized that demand for better TV programs and the need for additional sources of income by many TV stations, would bring early support for pay TV. He declared that all of the advertising budgets in this country would be insufficient to support 500 stations, operating 10 hours daily.

A spokesman for RETMA noted that the association was certainly sympathetic to all new developments and if the Commission approved pay TV, manufacturers would be ready with the necessary gear.

Also on the podium was Ned Irish, prexy of Madison Square Garden. Comments by Abel Greene, Commissioner of the National Boxing Commission, were read into the record by Morris Mogelev of the New Jersey State Boxing Commission. Others at the meeting included representatives from WIFE, Dayton, O.; WACH, Newport News, Va.; WFPF-TV, Atlantic City, N. J.; WLBR-TV, Lebanon, Pa.; WTEV, New Bedford, Mass.; WNLC-TV, New London, Conn.; WOR-TV, New York City; WSTF, Stamford, Conn.; WIBG-TV, Philadelphia; WILM-TV, Wilmington, Del.; WKDN, Camden, N. J.; WEEU-TV, Reading, Pa.; WTTM-TV, Trenton, N. J.; WBES-TV, Buffalo, N. Y.; WBOC-TV, Salisbury, Md.; WELI-TV, New Haven, Conn.; and WHDN, New Brunswick, N. J.

To add more intrigue to the affair, the Commission received a sixth request for pay-see approval from WOCN, Atlantic City, N. J. Management of this station declared that it agreed with the others who filed for subscription television, noting that currently, the availability or non-availability of network affiliation often represented a . . . "life and death factor" in the station's economic ability to stay above water. They were not concerned with the method used to provide pay-see operation, their report added. Rather they were concerned with immediacy of action on the proposal. Nothing short . . . "of a national tragedy" . . . will occur, they added, if neither network tieup nor some alternative means appears for u.h.f. stations to obtain headline programming and financial support.

## New Flyweight Magnemite



## Electric-Motor Battery-Operated Portable Recorder

The ideal recorder for newspaper reporting, recording lectures, telephone monitoring, field reports, traveling secretary, on-the-spot interviews, reference recording, customer interviews, salesmen reports and secret recordings. Combines, for the first time, ease and efficiency of operation with maximum reduction of weight. Performs anywhere, producing professional results under adverse conditions. Fly-ball governor-controlled electric motor plus triple shielding assures constant speed and freedom from hash. Weather-tight, satin-finished, aluminum alloy case gives complete protection to recorder. Three models available in speeds of 15/16, 1 1/4 and 3 3/4 ips.

### Check these unusual features:

- ★ Records for 4 full hours (Model 310-A)
- ★ Operates from self-contained dry cells
- ★ Immediate playback
- ★ Size: 5 1/2 x 9 x 12 inches
- ★ Weight: only 8 pounds

Write for complete technical literature and direct factory prices to Dept. RT



**AMPLIFIER CORP.  
of AMERICA**

398 Broadway, N. Y. 13, N. Y.

\*T.M. Reg. U.S. Pat. Off.

(Advertisement)



"Better make sure first that it's equipped with a Jensen needle."

In the opinion of Commissioner Edward Webster, the decision to authorize subscription TV will be up to Congress; they will have to establish a policy and perhaps amend the Communications Act, which would authorize a fee service. Reviewing this rather delicate subject, the Commissioner said: "Very little vision is required to see that if subscription TV is authorized and it proves to be the most profitable method of operating a station, the best hours of every day will obviously be devoted to subscription, rather than free television. Every TV station licensee will be clamoring for subscription rights and will be pounding on the Commission's door for regulation, insuring that there will be no discrimination in the issuance of such rights or the rates charged . . . At the same time, owners of receivers will be fighting to retain free programming, or at the very least, will expect the Commission to promulgate rules which will provide the public with a choice of free programs during the best viewing hours, and which will insure the viewers of reasonable and non-discriminatory fees for the subscription programs . . . Those considerations point to common carrier rather than broadcast type regulations."

Legislation introduced during the last Congressional session by Rep. Carl Hinshaw also accented the fact that the term broadcasting would have to be redefined and subscription and theater TV would become common carrier type services.

Commissioner Webster wondered, he told those at the meeting, if subscription TV were not a method of . . . point-to-point communications, closely analogous to the system of multiple-addressed communications or programs addressed to selected receivers." He wondered, too, he continued, if pay-see TV was a . . . "service in which only subscribers who pay a fee on a per-program basis can view the program, a broadcast service as the American public knows it, or is it a common carrier service for hire?" . . . "Is that segment of the population which either feels it cannot afford the subscription service or who does not want it, to be denied the right to view programs on publicly-owned channels, which are presently available to them on a no-charge basis?" asked the FCC member.

Truly a complex problem faces both the Commission and Congress, and Mr. and Mrs. Viewer, too. The winter of '54 may see an answer . . . and an important answer it will be!

**MISREPRESENTATION** AS to the effectiveness of TV antennas has again been soundly scored by the Federal Trade Commission. In a brief containing proposed trade practice rules for industry, the FTC notes that it should be an unfair trade practice to . . . "make or publish any false, misleading, or deceptive statement or representation, by way of advertisement,

# LOOKING for the RIGHT TV REPLACEMENT TRANSFORMER?



you'll find it in

## STANCOR'S NEW TV REPLACEMENT GUIDE

Easier to use . . . lists replacements by manufacturer's model and chassis number and also by original part number.

Up-to-date . . . over 5600 models and chassis are covered, including virtually all sets built prior to 1953 as well as most 1953 models.

You'll save time and trouble when you use this valuable Stancor reference. Get it now from your Stancor distributor, or write us directly for your free copy.



### FIVE NEW STANCOR EXACT REPLACEMENT FLYBACKS

Many of these units are the result of recommendations of the Stancor Servicemen Advisory Board, composed of the top TV servicemen throughout the country.

**PLUS** A-8126, Universal vertical blocking-oscillator transformer for all Philco sets, including 1953 models.

Stancor Part No.	Exact Replacement For	No. of Models Using Flyback
A-8137	Hoffman #5035	29
A-8220	Philco #32-8555	24
A-8221	Philco #32-8565	18
A-8222	Philco #32-8533 & #32-8534	38
A-8223	Philco #32-8572	15



### CHICAGO STANDARD TRANSFORMER CORPORATION

3534 ELSTON AVENUE • CHICAGO 18, ILLINOIS

EXPORT SALES—Roburn Agencies, Inc., 39 Warren St., New York 7, N. Y.

### SCHEMATICS—CONVERSIONS FOR SURPLUS GEAR

**NEW LIST! MANY ADDITIONS!**

Send stamped, self addressed envelope for List C. Add 25c for chart explaining AN nomenclature.

R. E. BOX 1220  
GOODHEART BEVERLY HILLS, CAL.

### ANOTHER OUTSTANDING JOBBER PAYETTE RADIO, LTD.

730 St. James West Montreal, Canada

HAS THE SENSATIONAL NEW **EICO** 470-K 7" SCOPE KIT IN STOCK! \$79.95



### CORONA RADIO KITS

- Easy Assembly
- Excellent Reception

#### SINGLE BAND SUPER

Rocket 110K—Latest superhet circuit for ultimate in sensitivity, reception and tonal quality. Kit includes all necessary parts, punched chassis, attractive bakelite mahogany cabinet, built-in iron antenna, iron core IF, 501A 3525, Automatic vol. control, beam output. Tuning 540 to 1700 Mc. Simple step-by-step instructions included. . . . Net **\$14.75**

#### 2 BAND AC-DC SUPER

Planer 812K—Excellent sensitivity. Tuning standard Broadcast 535 to 1800 Mc. foreign short-wave 8 to 18 Mc. 10.0 to 30 meters. Features iron core IFs, beam-tropic tone control, 5" Alnico PM speaker, phono jack. Handsome bakelite mahogany cabinet, 111x8x5 1/2". Tubes: 12SK7, 12SA7, 12X07, 501A, 3525. All parts, punched chassis, easy step-by-step instructions included. . . . Net **\$20.75**

#### 3-BAND SUPER Globemaster 814K Complete Kit

Kit includes all necessary parts, punched chassis, easy step-by-step instructions included. . . . Net **\$24.75**

All kits shunt lead wire and solder. Please include 25c deposit with C.O.D. Orders. Dept. N-12

**CORONA RADIO & TV CO.**  
238 LIBERTY ST. NEW YORK 6, N. Y.

**WE BOUGHT**

**SET MANUFACTURERS'**

**CLOSE-OUTS**

# TUBES

**ALL RADIO**

**AND TV**

**TYPES**

**Standard Brand Warranty • BRANDED • Bulk or Individually Boxed**

1B3GT . . . . .54	6AC7 . . . . .68	6BH6 . . . . .46	6SN7GT . . . . .46	12SN7GT . . . . .46
1L4 . . . . .47	6AH6 . . . . .61	6BJ6 . . . . .46	6T8 . . . . .61	12BG6G . . . . .1.16
1R5 . . . . .46	6AK5 . . . . .79	6BL7GT . . . . .76	6V6GT . . . . .41	19T8 . . . . .61
1S4 . . . . .52	6AL5 . . . . .34	6BQ6GT . . . . .76	6W4GT . . . . .41	25BQ6GT . . . . .79
1S5 . . . . .38	6AQ5 . . . . .38	6BQ7 . . . . .76	6W6GT . . . . .41	25L6GT . . . . .42
1T4 . . . . .46	6AG5 . . . . .46	6BK7 . . . . .68	6X5GT . . . . .31	35B5 . . . . .46
1U4 . . . . .46	6AT4 . . . . .36	6C4 . . . . .31	12AT6 . . . . .31	35C5 . . . . .46
1U5 . . . . .38	6AU6 . . . . .36	6C5 . . . . .41	12AT7 . . . . .57	35L6GT . . . . .42
1X2A . . . . .52	6AV6 . . . . .36	6C86 . . . . .42	12AU6 . . . . .34	35W4 . . . . .32
3Q5GT . . . . .55	6B4G . . . . .79	6CD6G . . . . .1.08	12AU7 . . . . .52	35Z5 . . . . .33
3S4 . . . . .46	6BA6 . . . . .33	6H6 . . . . .38	12BA6 . . . . .42	50B5 . . . . .46
3V4 . . . . .46	6BC5 . . . . .46	6J5GT . . . . .34	12BE6 . . . . .42	50C5 . . . . .46
5U4G . . . . .44	6BE6 . . . . .38	6J6 . . . . .51	12BH7 . . . . .53	50L6GT . . . . .42
5Y3GT . . . . .36	6BG6G . . . . .1.16	6K6GT . . . . .36		

**More than 400 types in stock. Include all your needs when ordering.**

Orders less than \$10.00—add \$1.00 service charge. Terms: 25% with order, balance C.O.D. Please include postage. All prices subject to change without notice. F.O.B. New York City. Mail order division.

**TeleVision Materials Corp.**  
125 Cedar St., New York 6, N. Y. • Cortlandt 7-4307



**NEW!  
ENLARGED!  
REVISED!**

**SPECIAL OFFER on this  
COMPLETE RADIO  
ENGINEERING  
LIBRARY**

• 5 Volumes • 3872 Pages • 2770 Illustrations

THIS new, up-to-date edition of a famous, 5-volume library covers the whole field of radio engineering . . . includes latest facts, standards, data, and practice to help you solve hundreds of problems in any field based on radio. Books cover circuit phenomena, networks, tube theory, amplification, measurements, etc.—give specialized treatment of all fields of practical design and application.

**SET INCLUDES:** Eastman's Fundamentals of Vacuum Tubes, 3rd Ed.; Terman's Radio Engineering, 3rd Ed.; Feeritt's Communication Engineering, 2nd Ed.; Hund's High Frequency Measurements, 2nd Ed.; and Henney's Radio Engineering Handbook, 4th Ed.

**SPECIAL LOW PRICE—EASY TERMS**  
**SAVE \$10.00**—Regular price of books is \$17.50; when bought as a set, you pay only \$27.50, and on easy terms.

**10-DAY FREE TRIAL**

McGraw-Hill Book Co., 330 W. 42nd St., N. Y. C. 36

Send me for 10 days' FREE trial, the RADIO ENGINEERING LIBRARY. If not satisfied I will return books. Otherwise I will send \$7.50, plus delivery charges, then, and \$9 a month for 5 months. (We pay delivery if you send \$7.50 first payment WITH coupon; same return privilege.)


Print Name

Street

City  Zone  State

Employed by  RTN-12

This offer applies to U. S. only



## SOLAR MODEL CF Exam-eter

A must for the TV serviceman—Solar's famous Model CF is a sturdily constructed, reliable instrument designed to simplify Television and all other servicing.

- Has exclusive patented Quick-Check circuit for qualitative tests and intermittent checks without unsoldering capacitors
- Capacitance bridge—10 mmf to 2000 mf in 4 ranges
- Power factor—0 to 50 percent
- Insulation resistance—3 to 10,000 megohms
- Electrolytic leakage current reads directly on 4 1/2" meter
- Built-in d-c power supply continuously adjustable from 0-550 volts for electrolytic condenser tests at rated voltage
- 100 ohms to 7.0 megohm A-C resistance bridge
- 0-600 volt, D-C vacuum-tube voltmeter
- 10-50 volt A-C vacuum-tube voltmeter
- Quality Components for Long, Trouble-free Service • 115 V. 50-60 cy
- Complete with test leads
- Instruction manual

**\$69.95**  
F.O.B. N. Y.

Ready to operate Price: 20% deposit with order. Balance C.O.D. Jobbers—Write for discounts.

**ARCEE ELECTRONICS CO.**  
74 Cortlandt St., New York 7, N. Y.

**MORE CASH**

Att.: Schools, Labs, Hams!

Cash in on your surplus Radio Parts & Equipment! We pay more—or trade for something you really need. TV sets, Mobile Equipment Available for Trade. Write Now!

**HARIO SALES CO.**  
4109 Burbank Blvd.,  
Burbank, Calif. Cable HARIO



**Free!**

Get More Service Calls with  
**EICO DECALS**  
For Store Windows & Cars.  
Write EICO  
Brooklyn 11, N. Y. Dept. DE-1

label, mark, brand, or otherwise, concerning their (antennas) uniqueness, performance, ability to bring in distant transmission or utility for very-high or ultra-high reception."

Rapping misleading built-in and indoor antenna advertising, the FTC says that it should also be an unfair trade practice to make the . . . "unqualified general representation that TV sets equipped with built-in or indoor antennas will perform as satisfactorily as if they were equipped with outdoor antennas, when such is not the fact. When such representation is true only in a limited number of locations, or within a limited radius or TV transmitting stations, or only under specially favorable conditions, or under other performance limitations, it is an unfair trade practice under this rule to fail to make a clear disclosure of such limitations."

Also under consideration by the Commission are definitions for high fidelity, covering the specific characteristics that speakers, amplifiers, cartridges and enclosures should possess to insure truly wide-range reproduction.

**INTERNATIONAL TV RELAYS**, dismissed by many as moon talk, have found a serious audience in Europe. A short while ago, the BBC called a conference in London to discuss continental relays and make preliminary engineering arrangements for hook-ups during Christmas and New Years, which might become permanent during '54.

The networks would include, it was said, the existing BBC 405-line net of seven stations in the British Isles, the West German 625-line link of eight stations extending from Berlin to Baden-Baden, and between these a composite network comprising the RTF 819-line stations at Paris and Lille (with an extension to Strasbourg), the Belgian 625/819-line stations at Brussels, and the Dutch 625-line stations at Lopik and Eindhoven.

Since converters will play an important role in network operation, it was decided that, for the Christmas programs, each broadcaster would be responsible for the provision and installation of a converter where the incoming signal was of a different standard; an international converting station may be employed for this purpose. Such a station would form a link between a 405-line network to the west, an 819-line network to the south, and a 625-line link to the north. Each network, it was noted, would feed signals of its own standards to the converting station and would in turn be fed according to its own standards.

The novel conference was attended by representatives from Belgium, France, Germany, the Netherlands, the BBC, and members of the European Broadcasting Union.

Everyone eagerly looks forward to the inauguration of this unique link, one of the most unusual in the history of TV . . . L.W.

## SAVE AT HUDSON!



### FAMOUS MAKE UHF CONVERTER

what a  
VALUE! **\$24.50**

Matchless performance on all UHF channels from 14 thru 83. Includes latest engineering techniques. Easy tuning, no "channel bunching". Unique power supply and built-in Bow-Tie UHF antenna, in stylized bake lite cabinet. Easy to install. 117 V., 60 cy. AC. No. X-100

Brush BA-116, reg. list \$14.75. Fine for Home Recording, Amateur Use, P.A. Paging. Brown hampered metallic finish. For desk or hand use.  $\frac{1}{4}$ "-27 thread for floor stand. Wt. 1 1/2 lbs.

### XMAS VALUE!

**CRYSTAL  
MIKE**  
**\$5.95**

No. 54F350



### SYLVANIA POCKET OHMMETER



Reads 0 to 10,000 Ohms. Handiest tester yet! Direct reading. Uses one pencilite battery.  $\frac{5}{16}$ " long,  $\frac{7}{16}$ " dia. 17" lead. **\$4.95**  
S-5030

### BIG SAVINGS! CONICAL ANTENNA

All-Aluminum  
No. S-5103  
**\$2.95**

Hi-gain, channels 2-13. 10 dowelled elements. Seamless cross arm. Less mast, 6 lbs.

Dual-Stacked  
No. S-5104 **\$5.95**

### CLAMP-ON INDOOR ANTENNA

No. S-3018  
**\$1.09**

Handy, practical, efficient! Clamps on back of TV cabinet, shelf. Telescoping 4-ft. elements. Terrific buy! 2 1/2 lbs.

### WHY PAY MORE!

#### 300-OHM LEAD

45 mil.  $\pm 22$  7-strand  
No. S-5053 Brown  
No. S-5054 Clear **\$1.29** per 100 ft.  
Per 1000 ft. **\$9.00**

### COMMUNICATION RECEIVERS AT HUDSON

Complete stocks, all standard makes, lowest prices!



hallicrafters

S-38C **\$49.50**



National

SW-54 **\$49.95**

### SWELL XMAS GIFTS!



### PHILMORE "Easy-to-Build" AC-DC RADIO KITS

7001B — 2-tube, broadcast  
less tubes **\$7.50**  
Kit of tubes **1.68**  
7001C — 3-tube, broadcast  
& Shortwave, less tubes **\$11.95**  
Kit of tubes **2.63**  
1-phone headset **\$1.18**

### FREE! JUST OUT!

Hudson's Sensational  
"GIVEAWAY CELEBRATION"  
Bargain Bulletin... undreamed of Values in Radio & TV Equipment and Components. Don't miss out! Send for YOUR FREE COPY today.  
Dept. A-12

**Hudson**  
RADIO & TELEVISION COMP.  
ELECTRONIC & SOUND EQUIPMENT

Adjoining Radio City  
48 West 48th St.,  
New York 36, N. Y.  
Circle 8-4060

Downtown N.Y.C.  
212 Fulton St.  
New York 7  
Circle 8-4060

Minimum Order \$3  
Please include 20%  
Deposit with C.O.D.  
Orders.

New Jersey  
35 William St.  
Newark, N. J.  
MKret 4-3151

## U.H.F. Tuners (Continued from page 66)

labeled "Ant," the other "Mix." The bandwidth is determined by the amount of coupling (mostly capacitive) between networks and is adjusted by the nylon screw trimmer. The 6AF4 oscillator is conventional, but note that four r.f. chokes are employed, each subject to shorting, opening, or grounding. When the oscillator in this tuner is found to be inoperative, be sure to check these chokes.

The top view of a Mallory converter, the Model TV-101, is shown in Fig. 1. Note that all the trimmer adjustments for tracking the r.f. network are available from the top. The oscillator trimmer condenser, also accessible from the top, is located behind the 6AF4. The 1N72 mixer crystal is mounted on spring clips, avoiding the need for soldering to the delicate crystal. The oscillator injection voltage is coupled to the mixer by means of the 0.68  $\mu$ fd. condenser located on top of the chassis and visible in Fig. 1.

Despite improvements in the design of the moving contact arm, the Mallory tuning mechanism occasionally develops contact trouble, causing intermittents to appear. Contact cleaning fluid and a good lubricating grease will cure this trouble. Another source of service calls is the difficulty in tracking the tuning mechanism over the entire band. Where only one u.h.f. station is received, this is solved by peaking up the trimmer adjustments for best response at that station. When several u.h.f. stations can be picked up, a compromise alignment must be achieved, favoring the weakest station.

Representative of the resonant transmission line type of tuning device is the Granco system shown in Fig. 2. Here the two r.f. networks and the oscillator tank circuit are quarter wavelength transmission lines, and the frequency is varied by means of a noncontacting plunger which effectively reduces the length of the line. Since there is no metal-to-metal contact in this tuning device, intermittents due to the tuning action are practically nonexistent. Tracking adjustments for each of the tuned lines can be made in two ways. A master trimmer condenser, accessible from the top of the chassis, tunes each of the three networks. In addition, the relative position of each plunger can be set by turning the screw which holds the plunger onto the main tuning plate. By using these two adjustments, it is possible to track the r.f. network and oscillator fairly closely, and optimum results for at least two u.h.f. stations can always be achieved. With the exception of contact trouble, the Granco tuner and converter is subject to any of the other defects found in u.h.f. equipment and the troubleshooting methods outlined previously apply.

## Hi-fi COMPENTROL\* ... sweet-sounding business builder



Makes any music sound better! Assures hi-fi reproduction at low-volume levels.

This modern tone-blender puts boogie beat or high-pitched notes of operatic sopranos right in their place!

Centralab Compentrol is a combination volume control and Printed Electronic Circuit. It's specially developed for smoother reproduction of apparent bass and treble response on radios, audio amplifiers, phono combinations and TV sets.

You can stake your service reputation on this replacement — it actually improves original tone performance. Unique Centralab design means Compentrol needs no additional amplification... and there's no insertion loss.

\*Trademark

Your Centralab distributor has Compentrols in stock, in  $\frac{1}{2}$  and 1 meg. plain or switch types. See him for your supply and complete information.

# Centralab

CENTRALAB,  
A Division of Globe-Union Inc.  
910-E. Keefe Ave., Milwaukee 1, Wis.  
Please send me additional technical data on Compentrol.

Name.....  
Firm.....  
Address.....  
City..... Zone..... State.....

NOW AVAILABLE  
VICO'S

# U H F BOOSTER

CLEAR UP  
YOUR "SNOWY"  
PICTURE

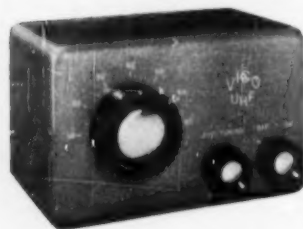
EXCLUSIVE MICROWAVE  
TRIODE GIVES QUALITY  
PICTURE BY BOOSTING  
SIGNAL TO NOISE RATIO  
IN ALL LOCALITIES...

ONLY

## VICO'S UHF

CAN OFFER  
THESE FEATURES

- 14 DB GAIN
- 6 DB NOISE FIGURE
- PERFECT ALL CHANNEL  
ANTENNA MATCH



DEALER NET  
**\$29.95**

JOBBER INQUIRIES INVITED



VIDEO INSTRUMENT COMPANY  
5458 W. WASHINGTON BLVD., LOS ANGELES 16, CALIF.

The *Standard Coil* 82-channel tuner described in the September, 1953 issue of *RADIO & TELEVISION NEWS* is somewhat different in its susceptibility to trouble in the u.h.f. section. Being a turret tuner, troubles can be isolated by using a new set of coil strips when the defect appears only at one channel, and by removing the entire drum when the defect appears on all channels. Fig. 7 is a diagram of the u.h.f. portion of the tuner, and Fig. 3 shows a u.h.f. coil strip corresponding to the section marked "D" in Fig. 7. The contact pins on the coil strip are underneath the coils and condenser blades. The u.h.f. portion of this tuner works in decades, channels 20 to 29, 30 to 39, etc., with each of the coil plates covering one decade or ten channels. The individual channels, or digits, are selected by means of a dielectric rotor assembly which rotates inside the drum and varies the capacity of the condensers whose stator blades are seen in Fig. 3.

In the *Standard Coil* tuner contact trouble is confined to switching from channel 19 to 20, 29 to 30, etc., and this trouble can be cured in the same manner as contact trouble in the v.h.f. *Standard Coil* tuner. The use of wiping contacts is designed to cut down corrosion and decrease contact trouble.

In addition to three master trimmer condensers mounted on the u.h.f. chassis, each individual coil plate can be adjusted for optimum performance, and to correct mistracking and the resultant weak signals. This adjustment can be done by spreading or compressing coils and bending the stator blades slightly. Because the stators are embedded in the plastic coil strip, care must be taken in any adjustment to avoid breaking the strip. With the *Standard Coil* 82-channel tuner, it is possible to get maximum signal transfer on at least one channel in every decade, making the over-all tracking quite constant.

The input network consists of three condensers and two shunt coils, making up a two-section high-pass filter (see Fig. 7). This filter will prevent interference from strong v.h.f. stations and police transmitters. Other defects such as an inoperative oscillator, or a defective crystal mixer, can be located and repaired by the method outlined.

The *Kingston Products* u.h.f. tuner which is used widely in the *Regency* line of converters and tuners, differs from most of the other tuners in that only a single-tuned r.f. network is used. Furthermore, the tuned transmission line used here consists of a parallel balanced line which has a sliding, shorting spring for tuning. The appearance and tuning arrangement of this mechanism is shown in Fig. 4. In order to simplify the mechanical drive and to save space, the parallel lines are curved around the outside of the assembly. The lower half of the unit contains the oscillator tank circuit, also a balanced, parallel transmission line. Trouble-

shooting this tuner is made a little difficult by the fact that the oscillator socket is not easily accessible. Checking the r.f. chokes and other parts for shorts, poor solder connections, or other defects, especially those causing intermittents, is quite involved.

Improving weak signals by better tracking can be done quite efficiently. Note that there is one oscillator tracking trimmer and two separate trimmers for the r.f. network, one affecting the entire band, the other tuning only the lower u.h.f. channels. Additional adjustment is possible by changing the position of the oscillator or r.f. sliding short on the main tuning pulley.

Contact trouble may occur; however, the shorting spring and transmission line elements are all silver-plated to reduce the need for contact cleaning and lubrication.

The *Kingston Products* tuner has only a single-tuned r.f. network with fixed coupling to a broadly-tuned antenna loop and this permits slightly more oscillator radiation than in the more sharply tuned u.h.f. tuners, especially when the tracking is not optimized. The original *Kingston* tuner also does not have a built-in high-pass filter but the *Regency* converter does contain such a filter to eliminate interference.

The basic u.h.f. portion of the *Philco* tuner is shown in Fig. 8. This tuner uses condenser tuning and employs an elaborate, well-constructed, ganged variable condenser as the heart of the tuning mechanism. The circuit diagram in Fig. 8A shows an input filter to keep out v.h.f. and i.f. interference, and a 150-ohm matching section which connects to suitable taps on the antenna coils. Note that each resonant circuit is made up of two series networks, connected in parallel. The antenna tank, for example, has series networks,  $L_1$ , one half of  $C_1$ , and  $C_{1a}$ , connected in parallel with  $L_2$ ,  $C_{2a}$ , and the second half of  $C_1$ . The result of this arrangement is to make the coils and condensers physically practical and also to permit balanced operation. An idea of the appearance of these networks can be obtained from Fig. 8B. The coils are flat strips of brass, bent into horseshoe shape, and mounted directly on the stator blades of the variable condenser. Using a balanced circuit permits grounding the rotor shaft and this allows a simple mechanical assembly. The electrical performance of this system can be compared to that of other continuous tuners having a double-tuned r.f. network, except that because capacity tuning is used, the bandwidth of the r.f. section will vary somewhat over the u.h.f. band.

An inoperative tuner, especially when the oscillator is at fault, is fairly simple to repair since the oscillator tube socket and all components are accessible once the shield cover is removed. In addition, as the circuit diagram indicates, an ample number of test points is provided. To check the oscillator operation, the grid cur-

rent can be measured by using the proper test point and, similarly, the crystal mixer current can be measured without unsoldering or disturbing anything.

For tracking the oscillator two adjustments are available, the trimmer  $C_s$ , which sets the high-frequency end, and the slug tuning of coils  $L_{11}$  and  $L_{12}$ , which should be set at the low end of the u.h.f. band. Each of the r.f. networks has one tracking trimmer, and to get good tracking at several points in the band sometimes requires the bending of the rotor plates. This is not recommended except in an emergency and only when the proper alignment setup is available to check the result of this procedure.

Intermittents in the Philco tuner can be due to poor solder connections, and broken or defective components just like in any other tuner. Locating such defects requires removal of the shield cover and after that, mechanical inspection will generally turn up the guilty part. When an intermittent appears due to tuning, two possible trouble spots should be checked. The rotor blades may be shorted, either due to bending, or due to dust and dirt getting into the variable condenser. (The sections tuning the r.f. network are spaced

much wider than the oscillator section so the latter should be the prime suspect.) The other trouble spot is at the rotor shaft grounding springs. Poor grounds at one or two spots are sometimes due to a speck of dirt which gets into the groove and lifts the spring away from its usual contact point. Cleaning the grounding springs and surrounding areas with contact cleaner will usually clear up this type of trouble.

Interference due to v.h.f. stations or i.f. signals is rarely a problem in the Philco tuner due to its elaborate input filter network and its fairly narrow r.f. bandpass. Similarly, oscillator radiation is at a minimum when the tuner is properly aligned.

Another widely used u.h.f. tuner which employs a variable condenser is the one produced by General Instrument Corp. Unlike the Philco unit, the GI tuner uses flat transmission lines which are condenser-tuned at one end. Tracking is difficult if optimum performance on several stations is desired, but as a last resort it is again possible to bend the rotor plates slightly. Intermittents due to tuning are handled as described for the Philco tuner. Most of the currently used models of the GI tuner employ an oscillator operating on a harmonic. This means that a 6J6, connected as push-pull oscillator, feeds into a "harmonic selector" network which takes the place of the oscillator tank circuit in other tuners. The drawback of using a harmonic of an oscillator is, of course, the possibility of various beats which might result in visible or audible interference.

In the main, u.h.f. tuner troubles can be narrowed down to four principal ones; 1. inoperative tuner, 2. weak signal, 3. intermittent operation, and 4. interference. Depending on the type of tuner and the number of u.h.f. and v.h.f. stations that can be received, most of these troubles can be traced to a particular section, and often even to a single suspected component. Knowing the four basic u.h.f. tuner troubles and being familiar with the features of today's u.h.f. tuners, the service technician will not find it difficult to troubleshoot u.h.f. tuners or converters.

In addition to the electrical defects described in this article, experience shows that a good portion of all service calls involving u.h.f. tuners is due to purely mechanical defects involving dial lights, dial cords, knobs slipping, etc. Considering these simple mechanical repairs and the almost equally easy electrical troubleshooting, there should hardly be any occasion for the capable technician to refuse service work on u.h.f. tuners or to simply refer everything back to the manufacturer. Aside from the long waiting period which often irritates the customer, his confidence will be retained by demonstrating that even the latest u.h.f. devices present no problem to his favorite TV service technician.

## Tangibly Great Sound Reproduction

IS WHAT YOU'LL HEAR AND FEEL WHILE LISTENING TO POPULAR OR CLASSICAL MUSIC THROUGH A

**BROOK**  
HIGH QUALITY  
AUDIO AMPLIFIER



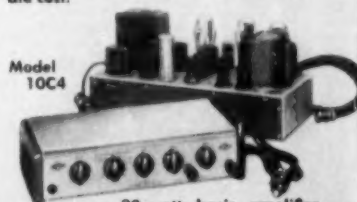
Model 22A

—handsomely compact 10-watt single-chassis combination. Quality sound, at cost so low any music lover can afford it.



Model 12A4

— combining famous BROOK 12A power amplifier, and flexible 4B pre-amplifier, at moderate cost.



Model 10C4

— 30-watt basic amplifier — remote control pre-amplifier combination; higher power for full-bodied orchestral passages.



Model 7

— Self-powered pre-amplifier perfect complement to any good basic amplifier

Every BROOK Amplifier is built to the highest possible standards of quality.

Write for full information on the complete BROOK line; also name of your nearest dealer. Dept. RM-3

**BROOK ELECTRONICS, INC.**

34 DuHART PLACE, ELIZABETH, N. J.

### Limited Number of Back Copies of RADIO & TELEVISION NEWS

Still Available  
Regular Price 35c

Issues over 6 months old 40c

BOX 1010

RADIO & TELEVISION NEWS  
366 Madison Ave., New York 17, N. Y.

### HIGH GAIN AT LOW COST NO PLUS DX SIGNALS POSSIBLE— NO TVI SMALL AREA REQUIRED FOR INSTALLATION

10-20-40 METER GROUND PLANE ANTENNAS ARE PRACTICAL USING OUR LIGHT-WEIGHT MOLYBDENUM STEEL WHIPS. COPPER PLATED WITH BAKED PAINT FINISH, THREADED LACERED SECTIONS, STANDARD 3/8" THREADED STUD ON BOTTOM SECTION. FIVE 10 FT. ELEMENTS SUITABLE FOR 20 METER GROUND PLANE. \$19.95

32-FOOT VERTICAL WHIP FOR FIXED SERVICES. USES 10 HEAVY DUTY COPPER PLATED STEEL THREADED SECTIONS. WHIP FOR 20 METERS, OR USE WITH GROUND PLANE FOR 40 METERS. \$9.95

16-FOOT MOBILE WHIP ANTENNA \$7.95

**SUPER RELAY BUYS**

SIGMA 4F 8000 ohms 1 ma. precision adjust. \$ 4.95

SIGMA 5B 5000 ohms 1 1/2 ma. herm. sealed. 5.95

SIGMA 5F 10,000 ohms super sensitive. 5.95

SIGMA 5B 130 ohms 2-24VDC \$2.95, sealed. 3.95

SIGMA 415F 10,000 ohms/2 1/2 ma. AC/DC \$2.45

SPOT. 2 for 10,000 ohms/2 1/2 ma. SPNO 2.50

G.E. Miniature 11,000 ohms 1/2 ma super sens 4.95

KURMAN BK35 11,000 ohms 1/2 ma super sens 1.95

KURMAN BK7 4000 ohm adjust. sens. 1/2-1 1/2 ma. 2.95

ALLIED BOKER-20 24 VDC DPDT sealed plug-in CLARE STEPPING RELAY, 3 pole 10 pos. 132 ohms. 40 VDC coil. 12-95

W.E. TELEGRAPH KEY, sealed HD contacts. 1.45

MURMEL TUBE SHIELD for 6X CHIT. 2.95

**FED. TEL-RADIO PT-125 FM MOBILE & FIXED 2 WAY SETS**  
Operates 152-165 mc. Unused, shop worn, requires some work to operate. Less tubes sold as is.

TRANSMITTER, 10 tubes 25 watt output less dyn. 24.95

RECEIVER, 12 tubes W/6 or 110 VAC supply. PRICE EITHER UNIT. \$12.95

Or both units for \$24.95

SEND FOR FREE CATALOG. MONEY BACK GUARANTEE ON ALL ITEMS. SAVE C.O.D. FEES, include post-ops, express refunded.

**ELECTRONIC SPECIALTY SUPPLY CO.**  
58 Walker Street, New York 13, New York

## Synchros

**C-79331 - TRANSMITTER - 115V**  
60 Cy. Delco, New, Limited Quantity  
Order Now. Wt. 11 lbs \$11.95

5B Motor - 115/90V - 60 Cy.	\$25.00
5CT Cont. Tr. - 90/55V - 60 Cy.	45.00
5DG Dif. Gen. - 90/90V - 60 Cy.	40.00
5F Motor - 115/90V - 60 Cy.	45.00
5G Gen. - 115/90V - 60 Cy.	45.00
5N Mtr. - 115/90V - 60 Cy.	25.00
6CT Cont. Tr. - 90/55V - 60 Cy.	60.00
6G Gen. - 115/90V - 60 Cy.	55.00
6SG Gen. - 115/90V - 60 Cy.	55.00
7DG Dif. Gen. - 80/90V - 60 Cy.	65.00
7G Gen. - 115/90V - 60 Cy.	75.00
C-56701 Repeater - 115V 60 Cy.	22.50
C-69406 Repeater - 115V 60 Cy.	22.50
C-78248 Trans. - 115V - 60 Cy.	25.00
C-78249 Dif. Gen. - 115V - 60 Cy.	7.50
C-78386 Trans. - 115V - 60 Cy.	22.50
81E - 113-2 G.E. Mtr. 115V 60 Cy.	22.50
81E - 123-2 G.E. Mtr. 115V 60 Cy.	22.50
Type A Bendix - 115V 60 Cy.	22.50
Type AA Henschel 115V-60 Cy.	22.50
Type M Bendix Mtr. 115V 60 Cy.	22.50
Type MB Henschel 115V 60 Cy.	22.50
ICT Cont. Trans. 90/55V 60 Cy.	65.00
IN Mtr. 115/90V - 60 Cy.	45.00
21F1 Gen. 115/57.5V - 400 Cy.	10.00
21G1 Gen. 57.5/57.5V - 400 Cy.	5.75
21H1 Dif. Gen. 57.5 - 400 Cy.	12.50
21D5J1 Mtr. - 220V - 60 Cy.	50.00
21SA-2 Gen. - 115/105V - 60 Cy.	25.00
21SF1 Cont. Tr. 105/55V-60 Cy.	45.00
21SL1 Cont. Tr. 105/55V-60 Cy.	45.00
21SLA1 Gen. 115/105V - 60 Cy.	25.00

21-151 Selsyn Generator G. E.  
57.5/57.5V - 400 Cy. \$9.95 per Pair



## Inverters

**MG-149F Holtzer Cabot**  
In: 28V DC 36A  
Out: 26V 400 Cy. 500 VA SP.  
115V 400 Cy. 750VA SP...\$ 65.00

**MG-149H Holtzer Cabot**  
In: 28V DC 44A  
Out: 26V 400 Cy. 250 VA SP.  
115V 400 Cy. 500VA SP...\$125.00

**MG-153F Holtzer Cabot**  
In: 28V DC 52A  
Out: 26V 400 Cy. 250VA SP.  
115V 400 Cy. 750 VA ThP...\$125.00

**10285 - Leland**  
In: 27V DC 60A  
Out: 26V 400 Cy. 50VA SP.  
115V 400 Cy. 750VA ThP...\$ 90.00

**104685 - Leland**  
In: 27.5DC 12.5A Cont. Duty  
Out: 115V AC 400 Cy. 175VA  
80PF ThP...\$ 90.00

**11702 or 10363 - Leland**  
In: 28V DC 12A  
Out: 115V 400 Cy. 115VA ThP...\$ 75.00

**PE - 109 - In: 12V DC 29A**  
Out: 115V AC 200VA  
400 Cy SP...\$ 65.00

**PE - Leland - In: 28V DC 38A**  
Out: 500V 800 Cy. 500VA SP.  
80V 800 Cy. 500VA SP...\$ 40.00

**PU-7 Wincharger - In: 28V DC 160A**  
Out: 115V 400 Cy. 2500VA SP...\$ 90.00

**PU-16 Wincharger - In: 28V DC 60A**  
Out: 115V 400 Cy. 6.5A SP...\$90.00

**PE-119 - Leland - Wincharger - G.E.**  
In: 28V DC 92A. Out: 115V  
380/500 Cy. 1500VA SP...\$40.00

**778-B Bendix - In: 24V DC 250VA**  
Out: 26V 400 Cy. 60VA SP.  
115V 400 Cy. 190VA SP...\$ 65.00

**800-1 Bendix - In: 24V DC 75A**  
Out: 115V AC 800 Cy.  
10.5A SP...\$ 40.00

**12116-2A Pioneer - In: 24V DC 5A**  
Out: 115V 400 Cy. 45W SP...\$ 65.00

**12117-2A Pioneer - In: 24V DC 1A**  
Out: 26V 400 Cy. 6VA SP...\$ 27.50

**12117-4B Pioneer - In: 28V DC 0.8A DC**  
Out: 26V AC 8VA 400 Cy. SP...\$ 27.50

**12126-2A Pioneer - In: 27.5V DC 1.25A**  
Out: 26V 400 Cy. 10VA ThP...\$ 35.00

**12130-4B Pioneer - In: 28V DC 12.18A**  
Out: 125V 400 Cy 141VA S Ph...\$ 75.00

We maintain an extensive stock of  
**RADAR, ELECTRONIC, and  
PRECISION TEST EQUIPMENT.**  
Your inquiries given immediate  
attention. All equipment is un-  
conditionally guaranteed.



A DIVISION OF  
**Arnold A. Sander, Inc.**  
6855 TUNJUNGA AVENUE  
NORTH HOLLYWOOD, CALIF.

# IMPROVED 10-METER MOBILE ANTENNA

By Lt. Col. BYRON E. HARGROVE, W4B50

*Recollection of an old principle and the "surprise" use of a 75-meter loading coil give new advantages on 10 meters.*

IT IS common practice when operating multi-band mobile to utilize a loaded antenna for other than ten meters. This usually takes the form of either a base coil or one inserted some distance up from the base. When operating ten meters with such an antenna combination, the loading coil normally is shorted out.

The author operates 10, 20, and 75 meter mobile with a bandswitching, v.f.o. controlled transmitter of his own design and construction housed in a 6"x9"x9" cabinet located within easy reach above the clutch pedal. The antenna used is a *Master Mobile Mount* with center-loaded shielded coils for 75 and 20. Following common practice, the coil formerly was shorted out for 10 meter operation.

Because the transmitter can be shifted from one band to another with such rapidity (one knob selects the proper coil for the 50 w. final, the proper exciter stage or stages, turns the heaters on or off in the used or unused multipliers, and changes the rate of tuning of the v.f.o. so that each phone band covers the entire v.f.o. dial) a means of rapidly shifting the antenna from one band to the other was greatly desired.

One possible solution lay in the use of the longest whip allowed (determined by overhead wires, trees, viaducts, etc., and the tolerance of an already harried XYL). Since the final uses pi-coupling networks in the plate circuit, power could be fed to such an antenna at any frequency. However, the efficiency on 75 meters, low with even the best arrangement, would have been too low to be tolerated.

In the course of pursuing the problem, the writer recalled occasions where a half-wave doublet for 75 meters fed with coax was used with fair success as a 7-half-waves out-of-phase long wire on 10 meters. If it works with half-waves why not with quarter-waves?

Accordingly the 75 meter coil was inserted in the antenna, the transmitter tuned to 10 meters, and lo! and behold, the transmitter loaded and behaved normally! Next question—was the energy going anywhere or was it being dissipated within the confines of the shielded coil?

Fortunately, our curiosity was soon satisfied since ten was exhibiting one

of its now-too-infrequent openings. A station was contacted in Florida and tests made comparing the performance of the loaded antenna and the straight whip with the coil shorted. In order to insure that the antenna changes and not conditions were responsible, the change was effected several times, always with a "much better" signal from the loaded antenna than with the coil shorted out.

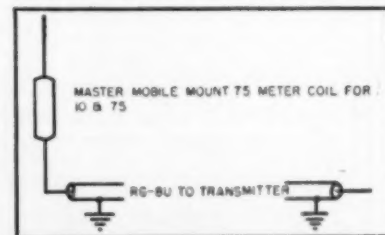
In the few openings that have occurred since making this discovery, a phenomenal percentage of contacts out of calls made has resulted. Exactly why the loaded antenna should perform so much better on 10 when using the 75 meter loading coil is not known. It is due apparently to the redistribution of current along the antenna, getting more of it up into the whip where it can be radiated.

The writer's antenna is installed on the right cowl of a 1948 *Studebaker Land Cruiser* at the height of the top of the air scoop. The RG-8-U coax lead to the transmitter is approximately four feet long. The shield is grounded at both ends. Using this combination, a change can be made from 10 to 75 meters or *vice versa* without stopping the car.

That is, you can do it without stopping if your transmitter controls are in easy reach, and you have marked the loading condenser settings. I suggest that you at least slow down! After all, you won't have that ten-meter QSO if you run into another car. Maybe you have gotten away with driving with a mike in your left hand, a knob in your right hand, and the steering wheel in your other hand, but such trick-riding gives amateur radio bad publicity.

Now what to do to include 20 meters? No answer yet, but we're working on it.

Plainly there is "nothing to it." The mobile antenna connects in the same old way.



# WIRE WARNING!

## WHY

pay more for questionable quality tubular TV lead-in wire?

\*subject to patent infringement.

## LOOK



for highest quality license-labeled Tubular TV Wire...

\*JSC Tubular Wire is manufactured under license of Amphenol Pat. 2543696.

## DEMAND



the most for your wire dollar... get BOTH Quality AND Low Price\*\*

\*\*JSC—Highest in Quality... Lowest in Price

**JSC NEW Twin Tubular TV Lead-In Wire...**

The best low loss, low cost 300 ohm lead-in for UHF and VHF television.

Rain, snow, dirt or salt deposits do not materially affect impedance and electrical efficiency. JSC tubular construction contains and protects the concentrated field of energy and reduces to a minimum high ratio signal losses.

Always Look for Orange and Blue Disc of Quality

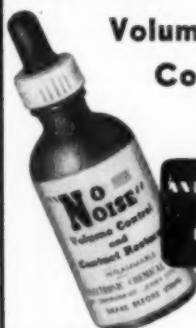


# STOP

Volume

Control

Noise!



**"NO NOISE"**

Contains the amazing new

## PERMA-FILM

### ★ CLEANS!

Gets rid of dirt and oxidation immediately on contact.

### ★ LUBRICATES!

One drop eliminates scratch, hum and noise.

### ★ PROTECTS!

NEW Perma-Film assures continued top performance.

### The PERFECT Contact Restorer

Cleans and restores volume controls, band switches, push button assemblies, electrical contacts.

### • NOT A CARBON TYP SOLUTION

NO NOISE is a scientific formula especially compounded for contacts!

Available in 8 oz. bottle, quart can, 2 oz. Bot-  
and 6 oz. spray can. Net to  
Service men

**\$1.00**

Nearest Distributor or order direct from

**ELECTRONIC CHEMICAL CORP.**

813 Communipaw Ave., Jersey City 4, N. J.

## "MR. WIRELESS"

By C. HOWARD BOWERS

THIS column is dedicated to "Old Time Wireless Operators." If you were among those pioneers of 1912 or thereabouts, please write us YOUR story.

With this issue we have the story of "Mr. Wireless," himself—Commander Edwin W. Lovejoy, U.S.N.R. Comdr. Lovejoy is now identified with the Federal Communications Commission, Washington, D. C., and is a very busy man. We feel very fortunate in getting his story. The Commander, known to his friends as "Ed," practically cut his teeth on a spark-gap! His first "Ticket" was a "Certificate of Skill in Wireless Telegraphy," issued in 1911 and although "Ed" admits having been chief operator and office manager for the old United Wireless Telegraph Company at "PJ" East San Pedro, California in 1912, age 18, we have reason to believe that that was not his first professional wireless job; however that is one detail we will have to skip! Station "PJ" (later "KPJ") handled a considerable amount of ship traffic in the Los Angeles area also quite a volume of point-to-point traffic with the company's other station at Avalon, Santa Catalina Island.

In 1913 United Wireless was absorbed by the Marconi Wireless Telegraph Co. During 1914 our subject pioneer operator accepted employment with the Federal Telegraph Company (of California)—later known as the Mackay Radio and Telegraph Company. The old Federal Company was then using the Poulsen Arc System and "Ed" was one of the first operators to use an Arc Transmitter on sea-going vessels. In succession, he was assigned by Federal to their stations, KFS-San Francisco, KLS-Los Angeles, and KFZ-Inglewood, California. (Ships appealed to "Ed" only while tied to the dock!)

On April 10, 1917 "Ed" joined the Navy as Chief Electrician's Mate (Radio) and served as radioman until June 1919. And, we quote, "That ended my career as a radio operator!" From that time, he went on to serve as Radio Inspector at Baltimore, and San Francisco. He later served as Radio Engineer and Inspector for the old Federal Radio Commission and the Department of Commerce (Radio Division), predecessors of the present Federal Communications Commission. His most important post was that of Supervisor of Radio, 7th Radio District, Seattle, Washington, from 1928 to 1933. Radio Inspector Lovejoy was well qualified to check other operators as he himself held an "Extra First Grade Commercial Operator License, (Pink Ticket) which required additional technical knowledge; also a code speed of 25 wpm Morse and 30 wpm Continental.

Having retained his US Naval Reserve status and having advanced to the rank of Lieut. Commander, "Ed" was ordered to active duty in May 1941 as Electronics Officer to study radar. That was before Pearl Harbor and as World War II advanced, he also advanced to full Commander (1943) and continued as Electronics Officer at several of the country's most important Navy Yards, until 1946, when he was mustered out of service.

Commander "Ed" Lovejoy has an enviable record in the field of radio and electronics, and we are sincere in tagging him, "Mr. Wireless."

WORLD'S LARGEST MANUFACTURER OF CUSTOM BUILT TELEVISION

# MATTISON

SILVER ROCKET 630 CHASSIS

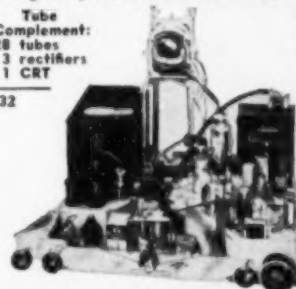
• with TUNEABLE •

**BUILT-IN BOOSTER for Better DX Reception**

Featuring NEW CASCODE TUNER made for UHF interchangeable tuning strips and COSINE YOKE

Tube Complement:  
28 tubes  
3 rectifiers  
1 CRT

32



## All Channel Booster

• Broad band single knob control pre-amplifier built in to eliminate long leads which may cause regeneration and attenuation of signal.

• ONLY THE MATTISON 630 CHASSIS HAS AN ALL CHANNEL TUNEABLE BUILT-IN BOOSTER THAT INCREASES SIGNAL STRENGTH UP TO 10 TIMES. THE SILVER ROCKET WILL OUTPERFORM ANY CHASSIS MADE AND IS PRICED RIGHT TO SELL FAST WITH

AN EXTRAORDINARY MARGIN OF PROFIT FOR YOU. ALSO AVAILABLE WITHOUT BOOSTER.

AVAILABLE FOR IMMEDIATE DELIVERY! SILVER ROCKET FOR 27" OPERATION

ANNOUNCING the New AMBASSADOR for 1954

The only open face console made in every expensive decorator finish... on guaranteed genuine mahogany, walnut, oak and other rare woods!



The AMBASSADOR 21" and 27"

Best Looking... Best Value, Too! Full size console for eye level television. Available in every expensive decorator finish. Featuring removable safety glass. ALL CABINETS MADE IN MATTISON'S OWN CABINET FACTORY.

DEALERS! SERVICE DEALERS! Here is your opportunity to become the "important" TV Dealer in your area for THE FINEST CUSTOM-BUILT LINE OF TV RECEIVERS. FREE! Write for Mattison's merchandising portfolio explaining the "UNASSEMBLED PLAN" and "\$1,000,000 FLOOR PLAN."



Manufactured with integrity

When you buy from Mattison you need only one source of supply! You can buy a Mattison Chassis, a Mattison Cabinet or a complete Mattison TV Set!

**Mattison Television & Radio Corp.**

10 West 181st St., Dept. RN, N.Y. 53, N.Y.

# NOW... Save MORE on TUBES!

INDIVIDUALLY BOXED • FULLY TESTED • EACH TUBE GUARANTEED FOR SIX MONTHS

Type	Price	Type	Price	Type	Price	Type	Price
1B3	.68	6AK5	1.03	6BJ6	.53	6SK7GT	.50
1H5	.48	6AK6	.63	6BK7	.90	6SL7GT	.67
1L4	.59	6AL5	.42	6BL7	.90	6SN7GT	.60
1N5	.58	6AN4	1.30	6BQ6	.98	6SQ7GT	.43
1R5	.62	6AQ5	.52	6BQ7	.90	6T8	.78
1S5	.51	6AQ6	.46	6BZ7	.99	6V8	.83
1T4	.58	6AR5	.41	6C4	.40	6V8GT	.50
1T5	.71	6AS5	.50	6C6	.55	6W4GT	.48
1X2	.68	6AT6	.41	6C6B	1.46	6W6GT	.57
3Q5	.67	6AU6	.46	6F6GT	.50	6X5GT	.38
3S4	.58	6AV6	.40	6H6GT	.53	6Y6G	.65
3V4	.58	6BA6	.96	6J5GT	.45	7N7	.59
6U4	.43	6BA6	.49	6J6	.63	12AT6	.41
6V4	.71	6BC5	.55	6K6GT	.45	12AT7	.76
6V3GT	.34	6BD5	.89	6L6G	.86	12AU6	.46
6AN4	.50	6BF5	.70	6L6GA	.86	12AU7	.60
6AF4	1.25	6BG6	1.43	6S4	.48	12AV6	.40
6AG5	.56	6BH6	.63	6SA7GT	.53	12AV7	.75
				6SJ7GT	.48	12AX7	.61

Each tube is performance-proven. 25% deposit must accompany all orders. Balance C.O.D. All prices F.O.B., N.Y.C. If remittance is made with order, you can deduct 2%. \$1.00 handling charge for orders under \$10.00. Subject to Prior Sale. Importer inquiries invited.

## PHILLIPS TUBE CO.

2281 NOSTRAND AVENUE  
BROOKLYN 10, NEW YORK

## PRE-WINTER SALE PRICES SLASHED

### T.V. TUBES—ROCK BOTTOM PRICES

In lots of 6 each No. only

6BQ6 .89¢ 6C6B .39¢ 6AQ5 .38¢ 6T8 .59¢  
12AX7 .47¢ 6AK5 .51¢ 6AL5 .42¢ 1L4 .48¢  
12AX7 .47¢ 6AK6 .57¢ 6AS5 .49¢ 1T4 .58¢

Tube Special—Broken Keys—Electrically Perfect

12AK5 .25¢ 4 for \$1.00 12K8 .49¢ 7 for \$3.00

Tube Sale—22AT-33-27-85-31-50—Air Mixed Ass't.

6 of Any Type \$2.25

Heavy Duty Shielded P.P. Input Trans. . . . \$1.00

H.D. Silver Contact Trans. Regs. . . . . 1.00

Isolantite Ortol Panel Clamp Sockets . . . . 3c ea.

100 Assorted Resistors . . . . . \$1.95

1 Mfd., 1,000V Oil Filled Cond. . . . . 75c

3 Gang Var. Cond. 450 K.C. with Gen. Section.

2 1/2 in. Pulley on 3/8" Shaft. . . . . 40c

Westinghouse Ruxox Rectifier 0.04 Amp. 28

Volts. Reg. \$11.00 ea. Special. . . . . \$1.00

BRAND NEW 16" PHONO RECORDS—Ass't.

Jazz—Pop—Jazz Rhythm—Blues—Please specify

\$2 for \$1.75 or 24 for \$3.00 or 50 for \$5.75

Single Pole—10 Pos. 8-Gang Switch. . . . . 25c

Grind your own Crystals. Pure Brazilian Quartz. Vari-

ous sizes and thicknesses. 1/4 lb. pkg. . . . \$1.00

4-Tube Drilled Chassis, 4 1/2"x10 1/2"x1 1/2". 25c each

Signal Corps Phones—2 M. Ohms (8 M. Ohms

Impd.) . . . . . \$1.25

3 ft. Ext. Cord (and Plug) . . . . . 40c

25" x 24" Bake, Panel Mounting—5 Res. 6 Mic. Com.

2 Choke Coils. . . . . 40c

21" M.H. R.F. Choke Coil . . . . . 27c ea.; 4 for \$1.00

7 PL. Und. Ass. AC Line Cord. . . . . 20c

Miniature T & P Pr. Sockets. . . . . 3c Ea. 50c Dns.

RCA 4"x8" Oval P.M. Speakers. . . . . \$1.25

**TUBULAR ELECTROLYTICS**

20-20 MFD. 150 V., 45c 30-30 MFD. 150 V., 97c

40-40 MFD. 150 V., 59c 50-50 MFD. 150 V., 79c

Low-Loss Short Wave 3 GANG T.R.F.

Lock Type Air Trimmer VARIABLE CON.

Variable Condensers D.E.N. 5 E.H. 8

5 PL.—20 Mmfd. 18c 10 PL.—20 Mmfd. 18c

7 PL.—25-30 Mmfd. 18c D.P.D.T. SLIDE

8 PL.—30-35 Mmfd. 20c TOWELE

14 PL.—50 Mmfd. 20c SWITCH . . . . . 15c

1,000 OHM WIRE WOUND POTENTIOMETER. 15c

30 HY-FILTER CHOKES SHIELDED. . . . . 3 for \$1.25

PIEZO CRYSTAL HOLDERS. 12 for \$1.00; \$6.00 per C

RCA Band Switches—

3 gang, 3 pos. 3 band 30c 6 gang, 4 pos. 4-5 band 40c

Trimmer-Padder Ass't.—all Isolantite—singles, dual;

Trimmer—100 ass't. . . . . \$2.25

ATTENTION: Prospectors, Explorers for Hidden Treas-

ures! Construct a U. S. Army Type of Metal Mine

Detector Amplifier. Amplifier unit only (uses tubes

and batteries) with cables, headphone cord, and jack.

Army wiring diagram. Type AN PRS-1 . . . . \$1.95

Philco push button Rotary Switch Double Pole. . . 35c

6 or 9 Gang Push Button Switch. . . . . 40c

DRILLED CHASSIS FOR 5-6 tubes 5"x10"x1 1/2". 25c

PHONE JACKS OPEN & CLOSED AUTO. . . . . 15c

150-1 RATIO VERNIER DIALS—4 in. dia. 1 in. hub 25c

SALE—PHONO RECORD ALBUMS—12" 3 comp.—15c

10" 3 comp.—15c 4 comp.—20c 12 comp.—50c

VULCAN HEAVY DUTY 100 WATT SOLDERING IRON.

Built for U.S.N.—Brand New—Envie, sells for

RR 50. . . . . OUR Price \$3.25

MINIMUM ORDER \$3.00—NO C.O.D.

SHIPMENTS—PLEASE INCLUDE POSTAGE

NEWARK SURPLUS MATERIALS CO.

324 Pine Street, Dept. N.O., NEWARK 1, N.J.

## T-V SERVICEMEN

Build your own portable  
TEST PATTERN GENER-  
ATOR! Send for diagram  
and instructions on how to  
build this new instrument.  
A complete generator—  
transmits a round pattern,  
including vertical and hori-  
zontal blanking pulses.  
Weighs less than 15 lbs. No  
more need to wait for T-V  
stations to come on when  
you have this instrument.  
Diagram and instructions  
priced at only \$5.00, send  
your order to:

**S. A. INSTRUMENT CO.**

414 Kathy Drive San Antonio, Texas

## TELEVISION

PREPARE FOR A GOOD JOB!

BROADCAST ENGINEER

COMMERCIAL OPERATOR (CODE)

RADIO SERVICING

Television Servicing

(Approved for Veterans)

SEND FOR FREE LITERATURE

BALTIMORE TECHNICAL INSTITUTE

1425 EUTAW PLACE, BALT. 17, MD.

## Within the Industry

(Continued from page 36)

Jr., Prestwood Electronics Co., Augus-  
ta, Ga.; Ralph E. Walker, Walker-  
Jimieson, Inc., Chicago; Leo I. Meyer-  
son, World Radio Labs, Inc., Council  
Bluffs, Iowa; Elliott Wilkinson, Wil-  
kinson Brothers, Dallas; Max I. Ep-  
stein, Federated Purchaser, Inc., New  
York City; R. V. Weatherford, R. V.  
Weatherford Co., Glendale, Calif.; H.  
M. Carpenter, Thurow Distributors,  
Inc., Tampa, Fla.; and L. B. Calama-  
ras, executive vice-president of NEDA.

**ALBERT E. HYLAS** has joined the en-  
gineering staff of *Industrial Television,*  
Inc. as chief devel-  
opment engineer.



Formerly associ-  
ated with the re-  
search division of  
*Allen B. Du Mont*  
*Laboratories, Inc.,*  
in his new post he  
will be concerned  
with the design and  
development of new products for both  
military and commercial applications.

He brings to his new position a di-  
versified background in electronic de-  
sign which has included work on color  
TV receiver and studio equipment,  
loran, and specialized test equipment.

**RAYMOND S. PERRY** has been elected  
president of *Federal Telephone and*  
*Radio Company* succeeding **HENRY C.**  
**ROEMER** who has been named vice-  
president in charge of administration  
of the domestic division of the parent  
company, *International Telephone and*  
*Telegraph Corporation* . . . **CHARLES**  
**B. DENTON** is the new marketing man-  
ager for *Weston Electrical Instrument*  
*Corporation*. In this newly-created  
post, he retains direction of the ad-  
vertising department but also assumes  
responsibility for the sale of all retail  
and distributor products . . . **MAJOR**  
**WILLIAM J. SCHOENBERGER**, recently  
released from active duty with the Air  
Force at the Wright Air Development  
Center, has joined *Insuline Corpora-*  
*tion of America* as assistant to the  
firm's president . . . *General Elec-*  
*tric Company* has made three de-  
partmental appointments in its newly-  
formed Commercial Equipment De-  
partment. **PAUL L. CHAMBERLAIN** has  
been named manager of the broadcast  
equipment department, **H. BRAINARD**  
**FANCHER** is the new manager for ger-  
manium products, while **HARRISON**  
**VAN AKEN, JR.** will be in charge of  
communication equipment . . . Pro-  
motion of **JACK D. HUGHES** to the  
position of vice-president and opera-  
tions general manager has been an-  
nounced by *Littelfuse, Inc.* He was  
formerly vice-president in charge of  
sales. He will continue to supervise  
sales in his new post . . . **S. W. GROSS**  
has been named vice-president in  
charge of sales for the *Emerson Ra-*  
*dio and Phonograph Corporation.* He

**PRICES SLASHED**  
to ROCK BOTTOM!

**COMMAND SETS**  
by-the-carload  
**SAVE NOW** during  
this **MARKET-BUSTING**  
**SALE!**

**Note—F.B. not available**

T-20/ARC-5 XMTR 4-5, 3 MC Like New...	\$ 7.50
T-21/ARC-5 XMTR 5.3-7 MC Like New...	6.95
T-22/ARC-5 XMTR 7-9.1 MC Like New...	9.95
R-26/ARC-5 RCVR 3-6 MC Used, Xlnt...	9.95
R-27/ARC-5 RCVR 6-9.1 MC Used, Xlnt...	7.95
1.5—3 MC RCVR Used, Xlnt...	24.95
190-550 MC RCVR Used, Good...	17.95
2.1-3 MC XMTR Used, Good...	12.95
3-4 MC XMTR Used...	19.95
RC-456 MODULATOR, Used, Good...	2.95
MD-7/ARC-5 MODULATOR, Used, Xlnt...	12.95
T-23/ARC-5 XMITTER, 100-156 MC and	
R-28/ARC-5 RCVR 100-156 MC...	pair 45.00
C-20/ARC-5 7-channel control box...	4.95
R-4/ARB-2 234-258 MC...	15.95
RCVR RACK, 2-section, \$2.95...3-section,	2.95
XMITR RACK, 2-section...	2.95
BC-412 W-METER & VACUUM COND, New	2.95
12 V DYNAMOTOR for Command Receivers...	9.95

**FULL 10% DISCOUNT ON ANY ORDER**  
**\$30 OR OVER ON ABOVE ITEMS**  
**TOP PRICES PAID FOR YOUR SURPLUS**  
**EQUIPMENT**

**RC-103 & AN ARN-5**  
**ILS EQUIPMENT**  
New, orig. cartons

**TBS, 3, 4 & 5.**  
New, Complete

AN/ART-13 & ATC EQUIP	Spare	SCR-729
T-47, T-47A or ATC Transmitters	Parts Available	RTA-1B
DY-11, 12, 17 or ATC Dyn	AN/ARN-7	BC-1016
CU-25 Load Unit	SCR-269G	APN-1
SA-22 Switch Unit	BC-611 & BC-721	APS-4
CU-26 Load Unit	IE-17	BC-348
O-16 LFO Unit	AN/APG-13A	APR-5
Navy Type Trans.	SCR-718	ARC-3
Mounts for ART-13	AN/ARC-1	APT-5
MT-283 & MT-284	SD-7 Radar Spare	APA-17
CU-24 Ant. Cap.	MG-153	BC-375
C-87 Cont. Box	MG-149 H & F	APA-11
	SCR-510	TA-25-24
		APN-9

**ALL PRICES ON REQUEST**  
**ALL MATERIAL ABOVE IN STOCK**

**Check This Value in**  
**PORTABLE FM XMITTERS & RCVRs**

Operate on 6V DC, 34 MC varied either  
direction depending Xtals, xmtr and rcvr.  
has aluminum case with antenna relay. Xmtr,  
uses 1073 125 KC xtal in one stage fol-  
lowed by 4 doubles and 1 fin. amp. all using  
HY-65 tubes. Mike amp. and Pre. Mod.  
uses 1C7G tubes. Xmtr. stages have meter-  
ing jacks. Rcvr. is superhet xtal cont. local  
one at 800 KC. Power Supply on chassis  
using Carter 6 V zen. output 450 V 250 ma  
6V vibrator power supply for receiver. All  
tubes inst. heating. Included is control box,  
hand set, 8" speaker and extra mike. Used/  
not tested. Complete set. **\$39.00**

**25 WATT PORTABLE FM XMITTER**

Model 565A. Power Output 25 watts. Freq. 30-40  
megs. xtal controlled. Input voltage 5.9 VDC.  
Used, not tested. Dynamotor ok and tested. Less  
speaker, control box, crystals and bottom mounting  
cover. With tubes and dyns. Rcvr. and Xmitter  
driver stages use local tubes (705, 77F, etc.).  
Xmitter final amplifier is 815 tube. Xmitter dyn:  
5.6 VDC at 175mA input, 500 VDC at 100 ma  
output. Receiver dyn: 5.6 VDC at 7.6A input  
250 VDC at 50 ma output. Meter plugs  
furnished for tuning xmtr. Price **\$45.00**

**IMPORTANT**

NO ORDER LESS THAN \$10.00. Send full  
amount of order. Do not send shipping costs.  
Merchandise will be shipped via Railway Ex-  
press with shipping costs COD, unless other-  
wise specified. California orders add 3% sales  
tax.

**V&H ELECTRONIC INDUSTRIES, Inc.**

Dept. RT, 2033 West Venice Blvd.  
LOS ANGELES 6, CALIFORNIA  
Phone: REpublic 3-1127

is returning to the company after an  
absence of nine years during which he  
engaged in his own business in the  
electronics field... The Rectifier Di-  
vision of **Sarkes Tarzian, Inc.** has made  
several new appointments of interest to  
the industry. **STANLEY NICIEJEWSKI**  
is the new sales manager, **ALFRED**  
**D'URSO** is the new assistant sales man-  
ager of distributor sales, while **FRED**  
**LUCAS** has been named assistant sales  
manager of industrial sales... **AL-**  
**LEN N. WHITE, JR.** has been appointed  
sales promotion manager of the *West-*  
*inghouse* Television-Radio Division at  
Metuchen, N. J. He succeeds **FRED**  
**McCARTHY** who has resigned...  
**ROBERT D. HALLOCK** is the new plant  
manager for *American Microphone*  
*Company* of Pasadena. He will be in  
charge of engineering and production  
and will be responsible for the devel-  
opment and design of new models in  
the company's line... *Pyramid Elec-*  
*tric Company* has appointed **WILLIAM**  
**J. SLAWSON** to the post of assistant  
sales manager of its jobber division.  
He formerly held a similar post with  
*Federal*... **LOUIS W. SELSOR** is now  
handling distributor sales for the *Jen-*  
*sen Manufacturing Company* of Chica-  
go. He was formerly sales manager for  
the *National Video Corp.*...  
**WOODRUFF BURR** has been appointed  
buyer of cabinets for the radio and  
television division of *CBS-Columbia,*  
*Inc.* He was formerly with *General*  
*Electric Company* and for the last five  
years with *Allen B. Du Mont Labora-*  
*tories, Inc.*... **WALTER H. HAWK** has  
been named manager of television op-  
erations for *Federal Telecommunica-*  
*tion Laboratories.*

\* \* \*

**DAVID GNESSIN** has been named edu-  
cational director for *Transvision, Inc.*  
He has been serving  
as editor of the  
company's televi-  
sion kit instruction  
booklets.



He is well-known  
in the service indus-  
try both for his lec-  
tures and for his  
articles in the tech-  
nical press. He has served as editor  
of the company's "Television Notes"  
magazine for the past four years.

In his new post, Mr. Gnessin has  
planned many more publications to ac-  
quaint the public with the true picture  
of television and to counteract adverse  
publicity about television servicing.

\* \* \*

**THE SECOND ANNUAL** International  
Sight and Sound Exposition has been  
scheduled for September 30, October  
1 and 2, 1954 at the Palmer House in  
Chicago.

This year's event, which drew more  
than 21,000 hi-fi enthusiasts, will be  
expanded in both size and scope. An  
additional floor will be reserved for  
exhibition purposes.

Plans for the 1954 event will be  
announced shortly.

**20-20**  
**PLUS!**

**S-268-Q**  
**Output**  
**Transformer**

± 1 db 8—80,000 cycles  
80 watts 30—40,000 cycles

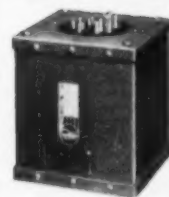
20 watts at 10 cycles  
40 watts at 15 cycles

Insertion loss  
0.3 db

**NOW IN STOCK**

Primary impedances  
8,000CT & 2,000CT

Connected between halved  
impedances, frequency  
response is extended at  
each end; between doubled  
impedances,  
± 1 db 15—45,000 cycles.



Write  
today  
for the  
1953  
Peerless  
Catalog

Perfect with KT-66 and  
6146 tubes



**PEERLESS**

**Electrical Products**

A DIVISION OF



9356 Santa Monica Blvd., Beverly Hills, Calif.  
161 Sixth Avenue, New York 13, New York



L. Veltri, busy service-dealer, of Westchester, N. Y., reports:

# I SAVED \$940\* by making a \$69 INVESTMENT in a Transvision FIELD STRENGTH METER

\* Says Mr. Veltri: "... The way I figure, in the last 6 months I saved that much money in installation time alone ..."



## FIELD STRENGTH METER Saves 50% of Installation Cost Pays for itself on 3 or 4 jobs

### NO TV SET NEEDED

**Works from antenna . . .** Measures actual picture signal strength directly from antenna. Shows antenna orientation maxima. Compares gain of antenna systems. Measures TVI on all channels. Checks receiver re-radiation (local oscillator). Permits one man antenna installation.



Eliminate variables, insure accuracy with direct meter readings on the FSM.

**PREVENT WASTE OF SERVICING TIME!** By checking antenna performance with the Field Strength Meter, the serviceman can determine whether the TV set or antenna, or both, are the source of trouble. Call backs are eliminated.



Don't lug sets. The Transvision FSM makes installation easy.

**Wide range:** Measures field strength from 10-50,000 microvolts. Has Fringe Area Switch for weak signal areas. 13 channel selector. Individually calibrated on every channel.

### ADAPTABLE for UHF

Model FSM-4, for 110V AC only. Complete with tubes. Wt. 13 lbs. . . . . **not \$69.**  
Model FSM-4B, for 110V AC and Battery Operation (case and cables included; batteries extra). Wt. 22 lbs. . . . . **not \$89.**

Order from your Jobber or from factory:  
**TRANSVISION INC., NEW ROCHELLE, N. Y.**

### Jobber Inquiries Invited



## 10 DAY TRIAL

Buy and try this fine instrument for 10 DAYS. Then, if you wish, you may return it. Your purchase price less 10% (our cost of handling and re-packaging) will be promptly refunded.

**TRANSVISION, INC.**  
**NEW ROCHELLE, N. Y.**

( ) Send me . . . . . Model FSM-4 . . . . . FSM-4B

( ) Enclosed find \$ . . . . . deposit. Balance C.O.D.

( ) MY JOBBER is . . . . .

I accept your 10 Day Trial terms.

Name . . . . .

Address . . . . .

City . . . . . State . . . . .

## Mac's Service Shop (Continued from page 72)

cent of the time at 50 per-cent of the locations. A rural location free from man-made noise is assumed. Instead of our dipole we use an antenna with a 6 db gain on channels 2-13 and one with a gain of 13 db on channels 14-83. Under those circumstances required signal strengths can be reduced to 47 db above 1 microvolt-per-meter on the low channels, 56 db on the high channels, and 64 db on the u.h.f. channels."

"Which looks like about 224 microvolts on the lows, 630 on the highs, and 1600 microvolts on the u.h.f. channels," Barney quickly translated.

"A lot of information is given in the pamphlet put out by the FCC on the methods used to arrive at these figures," Mac continued; "but one of the most interesting was the fact that the visual carrier had to be 30 db above the r.m.s. noise level for a satisfactory picture. The noise sources include those external to the receiver as well as noise generated within the receiver itself. The difference between 30 db and our minimum of 47 db for Grade B service in channels 2-6 is 17 db. This 17 db of maximum noise is equivalent to about seven microvolts-per-meter; so we can arbitrarily say that the noise level should not exceed 7 microvolts-per-meter at any location where a television receiver is to be used in a rural location."

"Have we got that much noise around here?"

"Personally, I do not think we have anywhere near that much noise at the average location here in town. To be sure of this, the noise would have to be measured with a special noise meter; but we can get a rough idea by using our service field strength meter to measure the signal delivered to the set and noticing how much signal strength is needed to overcome all noise interference. As you know, any time we get a signal of even 100 microvolts here, noise ceases to be a problem at all. From this I deduce that the average noise present must be considerably less than 7 microvolts-per-meter. To verify this, whenever we connect our field strength meter to an antenna and set it to an empty channel, we seldom get a reading of more than a microvolt or so. Everything seems to indicate that the noise level in this urban area is fairly close to what would be expected in a rural area."

"What kind of noises were they hollering about?"

"All kinds: auto ignition, electric drills, electric razors, sweepers, food mixers, electric sewing machines, x-rays, diathermy, high tension lines, diesel engines, and—I must not forget to mention—interference produced by you radio amateurs. I tried to point out that silencing all these noise sources would mean the stopping of

## SPECIAL VALUES

TS-13/AP X Band Signal Generator . . . . .	Exo. \$906.00
TS-14/AP Field Test Set . . . . .	Like New 400.00
3200-3370 mc. . . . .	Like New 400.00
LR-1 Signal Generator 160-30,000 KC. . . . .	115VAC, 60 cy. with xtal calibration, Exo. 1,200.00
Model 225X Hickok Universal crystal controlled Signal Generator . . . . .	Like New 125.00
Model 200C Hewlett Packard Audio Generator . . . . .	Exo. 100.00
Model 210AH Hewlett-Packard Square Wave Signal Generator . . . . .	Exo. 100.00
767/ARC-3 Transmitter, Receiver, Mounts, and Modulator with Dynamometer . . . . .	PUR* 100.00
RG/APN3 Receiver-Indicator . . . . .	PUR*
AN/SGC1 Teletypewriter Terminal Set . . . . .	Like New 225.00
RTA-1B Bendix Transmitter . . . . .	PUR*
Model 220 Clough Benzle AC Cap. & Lvs. Turns Ratio Bridge . . . . .	Exo. 45.00
Type 726A General Radio Vacuum Tube Voltmeter . . . . .	Exo. 125.00
804C Federal or General Radio Signal Gen. 8-330 mc. . . . .	Exo. 300.00
BC-221 or LM Pres. Meter . . . . .	Exo. 99.50
BC-221AC with modulation . . . . .	Exo. 150.00
General Electric Dual Regulated Power Supply Type ST9A . . . . .	New 300.00
Type 724A Precision Wavemeter General Radio 16 KC. to 50 mc. . . . .	Exo. 175.00
A LARGE STOCK OF ARC-1, ARC-3, ART-13, APN4A, APN4B, APN4, ARB, BC-312, BC-312, BC-318, BC-433G, BC-611, BC-1306, CUC-3, D6A, T222, 1E-19A, 1E-25A, 1E-30A, SCR-284, SCR-522, SCR-578, SCR-625, TCS, T19/APQ5, TS-34/AP, TS-100/AC, TS-184/AP, 150, Plus and Sol sets . . . . .	PUR*

\* PUR—Price upon request.

### WANTED

All types of radio and electronic surplus. We especially need: AP-10, APN3, APN4, ARB, ARC-1, ARC-3, ART-13, BC-312, BC-318, BC-433G, BC-611, BC-1306, CUC-3, D6A, T222, 1E-19A, 1E-25A, 1E-30A, SCR-284, SCR-522, SCR-578, SCR-625, TCS, T19/APQ5, TS-34/AP, TS-100/AC, TS-184/AP, 150, Plus and Sol sets.

### NEW CATALOG NOW AVAILABLE

## PHOTOCON SALES

417 N. Foothill Blvd. Sycamore 2-4131  
Pasadena 8, Calif. RYan 1-6751  
CABLE: Photocon, Pasadena.

## Let me show you how EASY it is to LEARN TV the practical way—



## ASSEMBLE A TRANSVISION TV KIT

**Pay as You Wire \$39**

I WILL HELP YOU to start learning TV the practical way — by assembling a TRANSVISION TV KIT in EASY STAGES. For only \$39 you get PACKAGE #1 (standard first pkg. for all of our kits). This package gives you the BASIC CHASSIS and over 450 TV COMPONENTS with complete Instructions, Drawing, Photos, Service Booklet, and a year's subscription to my "TV and Electronics Notes". When ready, you order the next stage (pkg. #2), etc. Low prices make your complete kit a terrific buy!

## FREE CATALOG

**Shows 6 Great TV Kits:**  
EXCLUSIVE: Only Transvision TV Kits are adaptable to UHF. Ideal for FRINGE AREAS. No Previous Technical Knowledge required. Write now!

**TRANSVISION, INC., Dept. RH12  
NEW ROCHELLE, N. Y.**

— MAIL THIS COUPON TODAY —

Mr. D. Gnessin, Educational Director  
TRANSVISION, INC., NEW ROCHELLE, N. Y. Dept. RH12

☐ I'm enclosing \$ . . . . . deposit. Send standard kit PACKAGE #1, with all Instruction Material, Balance C.O.D.

☐ Send FREE copy of your new TV Kit Catalog.

Name . . . . .

Address . . . . .

City . . . . . State . . . . .

all cars, building, cleaning, power transmission, bone-setting, etc., etc. A certain amount of noise is bound to be with us always, and any attempt to reduce it to absolute zero is foolish and impractical.

"As long as it stays within reasonable limits, the way to better reception lies in increasing the signal delivered to the set and in improving the set's ability to make the most of that signal after it gets it. Increased transmitter power, higher gain antennas, and improved signal-to-noise ratio in receivers are three factors that have already helped fringe area reception tremendously. The Johnny-come-lately in television reception would not know this; but those of us who have been trying to get a decent picture in the same fringe area location for several years can appreciate the tremendous improvement that has been made by the introduction of the cascode tuner alone."

"What else did you say to the assembled multitude?"

"As a clincher, I pointed out something that seemed to come as a rude shock to most of them: the fact that they were producing interference with their TV sets that not only caused trouble to each other but that also interfered with the enjoyment of radio reception in the homes of their neighbors. I explained how oscillator radiation from a TV set often wipes a picture entirely off the screen of a nearby set tuned to a weak signal on another channel. (Incidentally, I think you amateurs are getting full and false credit for most of this kind of interference.) On top of that I told them that hardly a day goes by without our getting a call from a radio listener who wants to know if we can remove the squeals and whistles from his radio that are only present when his neighbor's TV set is running. While most of the TV owners had noticed their sets interfered with their own radios, they did not realize the signal put out by the horizontal deflection system often travels several hundred feet. I thought that perhaps when they realized they were living in glass houses as far as producing television interference was concerned, they would not be quite so ready to reach for a stone to shy at the other fellow."

Barney shook his head doubtfully. "I quote from Mark Twain," he said. "There is no sadder sight than a young pessimist, except an old optimist."

## WISCONSIN CLUBS

THE Wisconsin Council of Radio Clubs recently held its annual meeting at Watertown, Wisconsin and elected new officers for the coming year.

John C. Doyle, W9GPI of Milwaukee was named president of the Council; Victor Stroebel, W9XAS of Rio was elected vice-president; Harold Peterson, W8NLH of Sturgeon Bay was named secretary; while Wm. Kerswill, W9LED of Wausau is the new treasurer.

December, 1953



*"Boy... Have I Got the Lines!"*

You, too, can have the lines—that meet your exact deadline conditions — whether you are a TV Set Dealer or Service Organization making the finest television reception installations, or a TV fan that demands sharp, "SNOW-FREE" pictures.

We specialize in the manufacture of television transmission lines — built with only one idea in mind: "THE FINEST TELEVISION RECEPTION."

### For UHF and VHF

"SHEATH-LEED" — the all-weather leadline for the toughest conditions: Salt spray in coastal areas; hot, humid weather, or for frosty, icy, wintry wind-whipping conditions which impose a severe tax... Pure Polyethylene Tubing encasing Standard GOODLINE AIRLEAD.

"GOODLINE" AIRLEAD — standard of leadline excellence — with 80% of the loss producing web removed. Correct impedance for sharp, "snow-free" pictures. Of pure polyethylene with flexible stranded copper-clad conductors. MANY IMPORTANT FEATURES.

NEW FULL-WEB "SHEATH-LEED" — the pure polyethylene of "SHEATH-LEED" and full characteristics of GOODLINE AIRLEAD — but NO PERFORATED WEB. No 20 (7 strand 28) copperweld wire in pure electronic golden clear polyethylene — with a pure silver-gray polyethylene sheath overall — for Maximum Weather Protection.

**Don Good, INC.**

SOLD BY LEADING  
JOBBER & DEALERS

Send coupon NOW!  
Get samples "in your hands"  
—you'll realize why  
Don Good Products make  
the finest television  
reception possible.

DON GOOD, INC. 1-31-1  
1014 Fair Oaks Ave., So. Pasadena, Calif.  
Please rush Samples and Complete Information covering Don Good Products.

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

SAVE MONEY! SAVE SERVICE CALLS!  
CHECK ALL TV, RADIO & PICTURE TUBES

with this VISULITE TV TUBE CHECKER

NO TECHNICAL KNOWLEDGE REQUIRED

Simple Instructions. Foolproof

SAFE—QUICK—FOOLPROOF

Only \$3.95 Complete

Most Radio set failures are due to burned out tubes

Just plug tube into socket

provided and Neon Lamp indicates this condition instantly

Operates on 110 Volts AC or DC

PERFORMS 1001 ELECTRICAL CHECKS!

Checks continuity of resistors, appliances, motors or any electrical device. Sturdily built for long life of trouble shooting.

Test Leads included—Nothing else to buy. SOLD ON 10 DAY MONEY BACK GUARANTEE. See it at your distributor today. If he can't supply, order direct from factory. \$3.95 Postpaid anywhere in the U. S.

VISULITE CO., Dept. RN12 112 Brannon St., New York 13, N. Y.

with this VISULITE TV TUBE CHECKER



110V. AC POWER SUPPLY  
FOR ANY 274-N RECEIVER

Just plug it into the rear of your 274-N RECEIVER... any model. Complete kit and black metal case, with ALL parts and diagrams. Simple and easy to build in a jiffy. Delivers 24 volts plus B voltage. No wiring changes to be made. Designed especially for the 274-N receiver. Only \$8.95.

Filament trans. for 274N receivers. Pri. 110V. 60 cy. AC. Sec. 24V @ .6A. An excellent buy at \$1.95 ea.

SPLINED TUNING KNOB  
FOR 274N RECEIVERS

An exclusive O-R item manufactured for us. Fits BC-453, BC-454 and other 274N receivers. This is a really hard-to-obtain item. Only .89c ea.



OFFENBACH-REIMUS

1564 Market Street, San Francisco, Calif.

## Do as TV manufacturers do ...use Hi-Vo-Kaps®

Centralab TV Hi-Vo-Kaps are the accepted standard of television manufacturers. That's why they're the recognized service leader tool.

They will withstand continuous overload, up to TWICE rated working voltage — and come back for more! Capacitors are complete, ready to install.

Hi-Vo-Kaps are 100% tested at rated test voltage. You get a factory-guaranteed exact replacement every time.

Use Hi-Vo-Kaps for filter and by-pass in TV high-voltage power supply... and pulse filter for cathode ray tubes. You'll find them the fastest... safest for guaranteed servicing capacitors you've ever used. Ten different combinations available — individually packaged for instant use. See your Centralab distributor for stocks NOW.

# Centralab

CENTRALAB,  
A Division of Globe-Union Inc.  
910-L E. Keefe Ave., Milwaukee 1, Wis.

Please send me latest technical data on Centralab's Ceramic TV Hi-Vo-Kaps.

Name.....

Firm.....

Address.....

City..... Zone..... State.....

### MODEL H-196

#### Insufficient picture width.

If, under very low line voltage conditions the picture width is not sufficient, even though the width control is set at maximum, check the code number on the deflection yoke. (This number is located under the "V" number on the yoke.) If the number is 98, 108, or 118, replace the yoke with one carrying any other code.

#### Poor vertical hold.

In weak signal areas, the vertical sync may be improved by replacing the 12AU7 sync amplifier tube (used in early production chassis) with a 12AT7. The 12AT7 is a medium- $\mu$  tube and will provide greater sync amplitude than will the 12AU7, which is a low- $\mu$  type. This change is a direct substitution; no wiring changes are necessary.

#### Prolonging tube life.

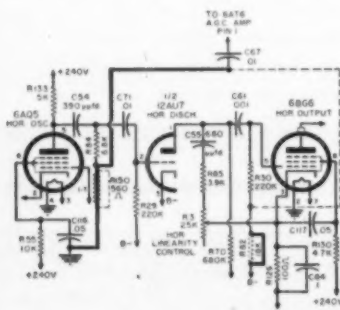
To prolong tube life in this model, replace the 5Z4 low-voltage rectifier by a 5V4G. The 5V4G has a higher current rating than the 5Z4 used in early production chassis. This is a direct substitute; no wiring changes are necessary.

#### 120-cycle modulation.

This condition may be eliminated by feeding the saw-tooth voltage to the 6AT6 a.g.c. amplifier from a different point.

To effect this change, do the following:

1. Remove the lead between the junction of  $R_{52}$  (18,000 ohms) and  $R_{50}$  (220,000 ohms), resistors in the grid circuit (pin 5) of the 6BG6 horizontal



output tube, and  $C_m$ , the .01- $\mu$ fd. condenser, to pin 1 of the 6AT6. (See accompanying diagram.)

2. Remove  $R_{52}$ , replacing it with a piece of solid wire.

3. Disconnect  $R_{51}$ , 6800-ohm resistor in the plate circuit (pin 5) of the 6AQ5 horizontal oscillator, from ground. Add a 560-ohm resistor ( $R_{100}$ ) between  $R_{51}$  and ground.

# SERVICE HINTS ON WESTINGHOUSE TV SETS

4. Connect one end of a wire to the junction of  $R_{51}$  and  $R_{100}$  and the other end to  $C_m$ .

### MODELS H-196 & H-207

#### Audio hum.

This condition may be reduced by adding a 30- $\mu$ fd. condenser across  $C_m$ , the 10- $\mu$ fd. condenser, connected between the screen (pin 6) of the 6AQ5 audio output tube and ground.

### MODELS H-196, H-207 & H-217

#### Sensitivity control adjustment.

The correct method of setting the sensitivity control on these models is as follows:

If the chassis is on the bench, set the control for .6 volt on the picture i.f. a.g.c. line with no signal input. If the set is in the customer's home, set the channel selector to an unused channel; turn the contrast control to maximum and the sensitivity control fully counterclockwise for maximum sensitivity. The screen should then be well filled with snow. The sensitivity control should then be turned clockwise very slowly, until the amount of snow just begins to decrease. The screen should still be saturated with snow, and the control should be locked at this position. The slot in the control will be approximately horizontal.

### MODELS H-207A, H-207B & H-217

#### Tube replacements.

For best results, replace the 12AX7 horizontal and vertical sync separator tube with an RCA type only, when replacement is necessary.

### MODEL H638K20

#### Vertical foldover.

To improve the horizontal linearity and eliminate foldover at the left of the raster, add a 33-ohm resistor in parallel with a .1- $\mu$ fd. condenser between the cathode (pin 3) of the horizontal output tube and ground.

#### Beat pattern in picture.

To prevent the appearance of an r.f. "tweet" on the low band channels, add an inductance (Westinghouse Part No. V-4886-2) in series with the heater lead between pin 4 of the 6C4 audio phase inverter, and pin 4 of the 6T8 ratio detector.

### MODEL H652K20

#### R.f. interference in picture.

Harmonics of the 4.5-mc. sound signal may, in some cases, be coupled into the a.g.c. line causing r.f. "tweet" on the picture.

To eliminate this condition, insert a 560-ohm resistor in the lead running from the a.g.c. diode (pin 6) of the 6T8 tube.

### MODELS H660C17 & H661C17

#### Sound in picture.

This condition may be due to a 4.5 mc. sound signal radiating from the tone



**Brand New  
Set Mfr's  
SURPLUS**

**TUBES**

**STANDARD  
BRAND  
WARRANTY**

Bulk Packed in Original Mfr's Nested Cartons or Individually Boxed  
Every tube meter and chassis tested for top quality... **BRANDED**

18J3GT ... .54	6AC7 .... .71	6BH6 .... .49	6SN7GT .. .49	19BG6G .. 1.19
1L4 ..... .50	6AH6 .... .64	6BJ6 .... .49	6T8 ..... .64	19T8 ..... .64
1R5 ..... .49	6AK5 .... .79	6BL7GT .. .79	6V6GT .... .44	25BQ6GT .. .82
1S4 ..... .55	6AL5 .... .37	6BQ6GT .. .79	6W4GT .... .44	25L6GT .... .45
1S5 ..... .41	6AQ5 .... .41	6BQ7 .... .79	6W6GT .... .44	35B5 ..... .49
1T4 ..... .49	6AG5 .... .49	6BK7 .... .71	6X5GT .... .34	35C5 ..... .49
1U4 ..... .49	6AT6 .... .39	6C4 ..... .34	12AT6 .... .34	35L6GT .... .45
1U5 ..... .41	6AU6 .... .39	6C5 ..... .44	12AT7 .... .60	35W4 ..... .35
1X2A .... .55	6AV6 .... .39	6CB4 .... .45	12AU6 .... .35	35Z5 ..... .36
3Q5GT .... .48	6B4G .... .82	6CD6G ... 1.11	12AU7 .... .55	50B5 ..... .49
354 ..... .49	6BA6 .... .36	6H6 ..... .41	12BA6 .... .45	50C5 ..... .49
3V4 ..... .49	6BC5 .... .49	6J5GT .... .37	12BE6 .... .56	50L6GT .... .45
5U4G .... .44	6BE6 .... .41	6J6 ..... .54	12BH7 .... .56	
5Y3GT .... .39	6BG6G ... 1.19	6K6GT .... .39	12SN7GT .. .49	

More than 400 types in stock, include all your needs when ordering. Orders less than \$10—add \$1.00 service charge. Terms: 25% with order, balance C.O.D. Please include postage. All prices subject to change without notice. F.O.B. New York City.

**TRANSAMERICA ELECTRONICS CORP.**

120 LIBERTY ST., NEW YORK 6, N. Y.

## GET INTO ELECTRONICS



You can enter this uncrowded, interesting field. Defense expansion, new developments demand trained specialists. Study all phases radio & electronics theory and practice: TV; FM; broadcasting; servicing; aviation, marine, police radio. 18-month course. Graduates in demand by major companies. H.S. or equivalent required. Begin Jan., March, June, Sept. Campus life. Write for catalog.

**VALPARAISO TECHNICAL INSTITUTE**  
Dept. RD Valparaiso, Indiana

**World's Only Recorder of its Kind  
WALKIE-RECORDALL  
8-LB SELF-POWERED BATTERY RECORDER**

- \*AUTOMATIC UNDETECTED RECORDING UP TO 4 HRS. Records noiselessly in or out of closed briefcase, containing hidden mike while walking, riding, flying. Conferences, lectures, dictation, 2-way phone. Permanent, unalterable, indexed recording at only 3c per hr.
- \*PICKS UP WITHIN 60 FT. RADIUS
- \*VOICE ACTIVATED SELF-START STOP
- \*NO WIRES OR PLUGS

812 Broadway, N. Y. 3, N. Y. Dept. RN-12

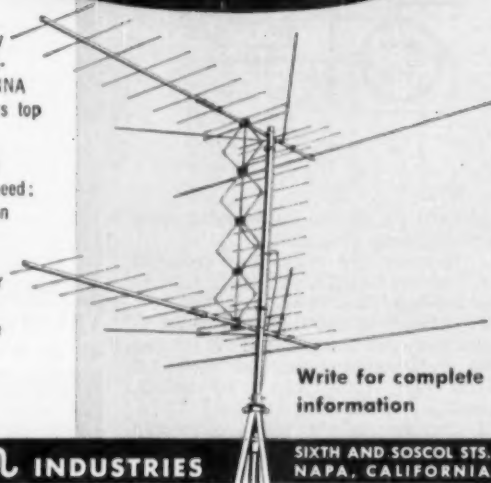
**ARKAY**  
world's finest radio kits  
Write for free Brochure  
RADIO KITS, INC., 120 Cedar St., N. Y. 6

**Now...**

**multi-moded, all channel  
tele-beam antenna**

For UHF or VHF or both... close-in or fringe... under any receiving conditions, the TELE-BEAM MULTI-MODED ANTENNA will guarantee your customers top reception on all channels.

Basic single Sabre Comet unit can be built up to meet any need; Add snorkel for an increase on VHF highs, stack these for more on all VHF channels; use diamond stacking bars for increase VHF and UHF gain; add UHF reflectors to increase the UHF gain and directivity.



Write for complete  
information

**tele-beam INDUSTRIES**

SIXTH AND SOSCOL STS.  
NAPA, CALIFORNIA

disconnecting the 10- $\mu$ fd. section of the electrolytic condenser and adding a separate 30- $\mu$ fd., 450-volt condenser.

4. Connect the 10- $\mu$ fd. section of the electrolytic condenser to pin 6 of the 6AU6 keyed a.g.c. tube.

5. Remove  $R_{213}$  (8000 ohms, 10 watts) from the chassis; This resistor was previously connected between pins 2 and 4 of the television-radio socket.

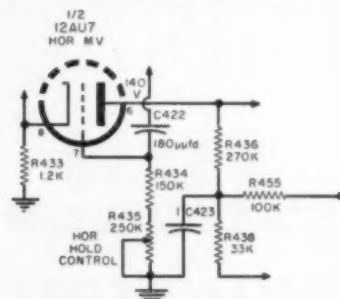
6. Add a 150,000-ohm resistor in series in the line running from pin 5 of the television-radio socket to pin 6 of the 6C4 audio phase inverter.

### SERIES V-2192 CHASSIS

Poor focus.

Improved focus may be obtained by increasing the voltage applied to the first anode (pin 10) of the CRT.

This is accomplished by disconnecting pin 10 of the CRT from the 320-volt supply line and connecting it to the junction of  $C_{123}$  (.1  $\mu$ fd.),  $R_{435}$  (270,000 ohms),  $R_{436}$  (33,000 ohms), and  $R_{438}$  (100,000 ohms). This junction is located in the plate supply circuit for



the pin 6 plate of the horizontal multivibrator. (Accompanying diagram shows the circuit before the change.)

### Horizontal instability.

The following changes will improve the stability of the horizontal multivibrator (12AU7):

1. Change  $C_{123}$  at pin 1 of the horizontal multivibrator from 120  $\mu$ fd. to 47  $\mu$ fd.

2. Change  $C_{123}$  between pins 1 and 7 of the horizontal multivibrator from 180  $\mu$ fd. to 120  $\mu$ fd.

3. Add a .1- $\mu$ fd. condenser in parallel with the horizontal hold control.

4. Change  $R_{435}$  in series with the horizontal hold control from 150,000 ohms to 270,000 ohms.

### Appearing retrace lines.

To eliminate retrace lines from the picture, make the following changes:

1. Remove  $C_{113}$ , the .1- $\mu$ fd. condenser, from its original position at pin 2 of the CRT.

2. Insert a 470,000-ohm resistor between pin 2 of the CRT, and the junction of  $C_{213}$  (.005- $\mu$ fd. condenser), and the arm of the brightness control.

3. Interchange the electrical positions of  $C_{123}$  (.1  $\mu$ fd.) and  $R_{435}$  (3300 ohms) at pin 2 of the 6SN7GT vertical multivibrator, so that  $C_{123}$  connects to pin 2 of the vertical multivibrator, and  $R_{435}$  connects to ground.

4. Reconnect  $C_{113}$  between pin 2 of the CRT and the junction of  $C_{413}$  and  $R_{423}$ .

# CRYSTALS

In FT 241-A Holders—15 in. Pin SPC. These are designated 54th or 72nd Harmonic MC freq. Listed by fundamental freq. with functions omitted.

## NOTE HUGE PRICE REDUCTIONS!

370	396	419	443	466	491	513
372	397	420	444	468	492	515
374	399	422	446	469	493	517
376	401	424	448	471	495	519
378	403	426	450	473	497	521
380	405	428	452	475	499	523
382	407	430	454	477	501	525
384	409	432	456	479	503	527
386	411	434	458	481	505	529
388	413	436	460	483	507	531
390	415	438	462	485	509	533
392	417	440	464	487	511	535
394	419	442	466	489	513	537
396	421	444	468	491	515	539

All above crystals sent postpaid. Foreign, wholesale, and dealer inquiries invited. Write for QUANTITY DISCOUNTS.

2 ASSORTED CRYSTALS ONLY..... \$1.25

10 for ..... \$1.99

## COMPLETE SET—80 CRYSTALS

In above graduations from 370-510 Kc. 54th Harmonic, INCLUDING 500 Kc. & 54th Harmonic, PLUG 500 Kc. & 54th Harmonic, ONLY..... \$9.95

## COMPLETE SET—120 CRYSTALS

In above graduations from 370-540 Kc. 72nd Harmonic, INCLUDING 500 Kc. & 72nd Harmonic, PLUG 500 Kc. & 72nd Harmonic, ONLY..... \$14.95

200 KC. CRYSTAL..... Per set \$1.75

500 KC. CRYSTAL..... Per set 75

1,000 KC. CRYSTAL..... Per set 2.75

All crystals sold as is.

FREE WRITE COMPASS—On request with every \$15.00 order for crystals.

## MISCELLANEOUS BEST BUYS

24 V. 2 AMP. TRANSFORMER: Primary 115 VAC 60 cycle. New. Only..... \$1.99

12 CHANNEL TV FRONT END: Silver Circle Tuner Can be used for 2-meter converter, receiver, etc. Factory reject for minor defects. Less Tubes. EACH..... \$1.25

Order 3 for ONLY..... \$3.25

ULTRA-VIOLET COCKPIT LIGHT: With fluorescent bulb. For use in hospitals, sick beds, submarines, training white light. All plastic sealed case. Less cord..... \$1.95

PILLOW SPEAKER: For use in hospitals, sick beds, submarines, training white light. All plastic sealed case. Less cord..... \$1.95

MINIATURE 6 V. WET CELL BATTERY: Ideal for model control equipment. Plastic case. 3 1/2" long x 1 1/2" wide x 2 1/2" high. New. EACH..... \$2.40

4 FOR ONLY..... \$8.50

APS-13 TRANSCEIVER: Complete with tubes and dynamotor. Easily converted to 420 KC. Excellent cond..... \$19.95

ARW-2 Remote Control Receiver

10 channel radio-tune receiver. Ideal for radio control, garage door opener, lawn mower, model boat and many other electronic control devices. Here are some of the parts it contains: ten 10,000-ohm resistors, 10 audio filter sections, 14 standard size tubes, 2 crystals, 24 V. power supply, plus many other useful items. ALL NEW. An unbeatable value at ONLY..... \$27.50

PE-73 DYNAMOTOR. Used. As is..... \$2.40

BARBEQUE ROTOR. AC. New..... 9.45

7-24 MIKE. New..... 1.25

TELEPHONE DIAL..... 1.25

4 METER. 0-1 mil. Just add scale..... 2.40

COMPLETE 2-WAY SOUND POWERED COMMUNICATION SET: Consists of single unit on each end PLUS 30 ft. of wire. This set COMPLETE only..... \$3.35

All prices are not F.O.B. Los Angeles.

All items subject to prior sale.

J. J. GLASS ELECTRONICS CO.

1615 S. MAIN STREET

LOS ANGELES 15, CALIF.

## READ RADIO & TELEVISION NEWS EVERY MONTH

**CODE SENDING RECEIVING SPEED**

Be a "key" man. Learn how to send and receive messages in code by telegraph and radio. Commerce needs thousands of men for jobs. Good pay, adventure, interesting work. Learn at home quickly through famous "Candle System". Quality for Amateur or Commercial License. Write for FREE BOOK.

CANDLE SYSTEM CO.  
Dept. 2-0, Box 928, Denver 1, Colo., U.S.A.

**Vertical instability.**  
To improve the vertical hold, change  $R_{in}$  at the input (terminal 3) to the integrating network from 1500 ohms to 1800 ohms.

## CHASSIS V2200-1, V2201-1, V2204-1 & V2206-1

Noise in audio.  
To suppress high audio frequency noise, do the following:

1. Change  $C_{in}$ , the .002- $\mu$ fd. condenser connected between the plate (pin 3) and cathode (pin 8) of the audio output tube (6W6GT), to .02  $\mu$ fd.
2. Change  $C_{in}$ , the .001  $\mu$ fd. condenser in the ratio detector de-emphasis network, to .002  $\mu$ fd.
3. To increase audio gain, change  $R_{in}$  (470,000 ohms) connected between the plate (pin 9) of the first audio amplifier (6T8) and the plate of the audio output tube, to 1 megohm.

## CHASSIS V2202-2 & V2202-3

Picture shape distortion.  
A tendency toward distortion of the picture shape may sometimes occur when the picture control is advanced beyond a certain point. To eliminate this, do the following:

1. Change  $C_{in}$  (.05- $\mu$ fd. condenser) in the pin 2 grid circuit of the 12AU7 horizontal multivibrator to .1  $\mu$ fd.
2. Change  $C_{in}$  (.1- $\mu$ fd. condenser) located along the plate supply line for the pin 6 plate of the horizontal multivibrator to a 10- $\mu$ fd. electrolytic. The negative side of this condenser should be connected to the 310-volt plate supply line to reduce the voltage across the condenser and prevent breakdown.
3. Add a 30- $\mu$ fd. condenser in parallel with  $C_{in}$  (40- $\mu$ fd. electrolytic) in the filter output of the low-voltage power supply.
4. Add a 100- $\mu$ fd. condenser between the grid of the horizontal output tube and ground. This condenser must be grounded at the same point as the cathode bypass condenser and must be dressed away from the chassis.
5. Add a 56- $\mu$ fd. condenser in parallel with  $C_{in}$ , the 56- $\mu$ fd. condenser between terminals 5 and 8 of the horizontal output transformer.
6. Change the two 100,000-ohm resistors,  $R_{in}$  and  $R_{in}$  in the CRT cathode circuit, to 220,000 ohms.
7. Disconnect  $R_{in}$ , the 100,000-ohm resistor in the plate supply circuit for the pin 2 plate of the vertical multivibrator from the "B+" line that goes to pin 10 of the CRT, and connect it instead to the "B+" line for the 6V6GT vertical output stage.

CHASSIS V-2216-1 & V-2216-2  
Black streaks in picture.  
To remedy this condition, replace the 6W6GT audio output tube. If this is not effective, insert a 2200-ohm resistor in series with the screen grid (pin 4) of the audio output tube, and a 680- $\mu$ fd. condenser in series between  $R_{in}$  (1 megohm) and the plate (pin 3) of the tube.

# BIG TALK about small rotary switches



**And why not?**  
These Centralab miniature switches give you new, small size... new flexibility... new protection. They carry the same ratings as the larger 2500 series switches plus excellent r.l. characteristics.



These PA-2000 switches feature one piece shaft construction for more accurate indexing. You can buy them with one to six sections per shaft—12 active positions per section. Sections are famous Centralab Steatite, in either shorting or non-shortening arrangements. Tests prove they can't be beat for dependability!

See your Centralab distributor and insist on Centralab Miniature Rotary Switches and Switch Kits. You'll always get exact replacement you want for guaranteed servicing.

BUY 'EM AS COMPLETE SWITCHES OR SEPARATE ASSEMBLIES. STEATITE SECTIONS, INDEXES, HARDWARE AND ACCESSORIES ALWAYS AVAILABLE.

# Centralab

CENTRALAB, A Division of Globe-Union Inc.  
910-L E. Keefe Ave., Milwaukee 1, Wis.

Please send me technical data on Centralab Miniature Rotary Switches and Kits.

Name.....  
Firm.....  
Address.....  
City..... Zone..... State.....

to the

E. E. or

## PHYSICS GRADUATE

with an interest  
or experience in

## RADAR or ELECTRONICS

Hughes Research and Development Laboratories, one of the nation's large electronic organizations, are now creating a number of new openings in an important phase of operations.

Here is  
what one of  
these  
positions offers  
you

### OUR COMPANY

located in Southern California, is presently engaged in the development of advanced radar devices, electronic computers and guided missiles.

### THESE NEW POSITIONS

are for men who will serve as technical advisors to the companies and government agencies purchasing Hughes equipment.

### YOU WILL BE TRAINED

(at full pay) in our Laboratories for several months until you are thoroughly familiar with the equipment that you will later help the Services to understand and properly employ.

### AFTER TRAINING

you may (1) remain with the Laboratories in Southern California in an instruction or administrative capacity, (2) become the Hughes representative at a company where our equipment is being installed, or (3) be the Hughes representative at a military base in this country—or overseas (single men only). Adequate traveling allowances are given, and married men keep their families with them at all times.

### YOUR FUTURE

in the expanding electronics field will be enhanced by the all-around experience gained. As the employment of commercial electronic systems increases, you will find this training in the most advanced techniques extremely valuable.

How  
to  
apply

If you are under 35 years of age  
and have an E.E. or Physics  
degree and an interest or  
experience in radar or electronics,

write

to **HUGHES**

RESEARCH AND DEVELOPMENT  
LABORATORIES

Scientific and Engineering Staff  
Culver City,  
Los Angeles County, California

Assurance is required that the relocation of the applicant will not cause the disruption of an urgent military project.

## The CBS-Colortron (Continued from page 63)

sets in proper working order, once they have been in the field, are likewise reduced.

The aperture mask is stamped into an arched-shape and six spring clips are welded around the edges. The studs holding three of the spring clips have small v-shaped surfaces on their heads which are designed to fit over three mating domes, or hemispheres, on the inside of the faceplate beyond the picture area. These hemispheres, which are molded into the glass, precisely locate the mask in relation to the screen. The six springs are clipped over the inside lip of the metal flange which is used to attach the faceplate panel to the funnel. These clips provide a small amount of forward thrust to keep the mask pressing down on the mounting hemispheres. There is no other assembly operation to be performed except to bring the faceplate panel and the funnel together and weld their flanges around the edges. The simplicity of this method of assembly is apparent.

Considerable speculation exists as to what size and shape the color picture tube will take in its ultimate form. Up to this time, the only tubes that have been demonstrated have shown relatively small pictures by present day standards and they have been in round bulbs. This is largely because the older, flat mask type of tube becomes exceedingly difficult to design and manufacture as larger sizes are attempted. The problems already mentioned become intensified and do not appear to be a simple linear function. The problem of maintaining dynamic convergence over wider angles than those already attempted in the flat mask type of tube may be considered as almost insurmountable.

The curved mask and faceplate tube, on the other hand, already has a six to one advantage in connection with the convergence problem in the same size of bulb and with the same deflection angle. It, therefore, becomes quite apparent that this type of tube can be expected to be made in larger sizes, having deflection angles comparable to present day black and white tubes. Likewise, we can expect to see these larger size tubes in the rectangular bulb shapes. This will contribute to cabinet economies because of the more efficient use of the space within the cabinets.

In summary, the CBS-Colortron appears to be the first such color tube ideally designed for mass production on largely existing manufacturing facilities. It eliminates several components found in earlier models and achieves an improvement in contrast, as well as a simplification of circuit requirements, adjustment time, and a reduction in the amount of really serious field service problems that would be the result of drifting of convergence circuits.

New Guaranteed	TUBES	Standard Brands
0A2	\$1.00 4E37	14.50 726C
0A3/VN75	1.10 4-128A	22.80 803
0A4G	1.00 4X150A	27.50 805
0A5	1.25 8M1	4.50 807
0C3/VN108	1.00 5C22	42.00 811A
0C3/VN180	1.00 5F7	1.95 813
1A3	1.00 5R40V	1.25 814
1B22	2.00 6AK5	8.00 829
1B23	2.50 6AL5W	1.75 830H
1B24	9.50 6AN5	2.90 832A
1B27	12.50 6AS7G	3.50 833A
1N210	2.50 CK1006	2.75 837
1N22	1.25 6K4	3.50 860
1N23	1.25 6L6	1.75 861
1N23B	2.25 6L7	3.95 866A
1N34A	.75 6C57	14.95 872A
1N38	1.50 RK60 1641	2.25 874
1N38A	1.25 VT-127A	2.95 884
1N63	2.15 100TH	9.50 931A
1N69	.65 250TH	16.50 954
1N70	2.55 304TL	7.95 955
2C39	12.50 307A RK75	3.95 958
2C40	2.50 394A	3.50 959A
2C51	4.50 417A	8.80 989
2D21	1.25 446A	1.15 991
2E22	1.95 460TH	44.50 1005
2E24	4.65	1616
2E25A	2.50	1623
2K22	22.50	1626
2K28	28.50	2051
2K32	28.50	2051
2K41	125.00	50-15
2K45	110.00	50-32
2K48	.75	12-32
3A4	1.25	00-20
3B26	3.50	5718
3C22	72.50 703A	4.50
3C24	1.50 705A	1.50
3C33	9.95 707A	8.95 5844
3C35	12.50 707B	4.50 8012
3E29	11.95 715A	5.50 8020
3G1	1.50 715B	7.50 9001
3GP1	3.95 715C	14.50 9001
3HP7	3.95 717A	90 9001
4C37	12.50 723A	16.95 9003
4C38	39.50 724B	2.75 3-309A
4C38	19.50 726B	45.50 3-592

Complete line of Receiving Tubes. Thousands of other types of Transmitting Tubes. If you don't see it, WRITE. Prices subject to change without notice. Californians add sales tax. Add postage to order.

### VEEDER ROOT COUNTER

5 figure. Adds ten for each revolution of shaft in one direction; subtracts ten for each revolution in opposite direction. Size 3 1/2" x 4 1/2" x 1 1/2" dovetail mounting; lever arm removable.

ONLY 1.25 ea.  
Quantity Discounts





**Jsh**  
SALES CO.

**ELECTRONICS**  
Dept. R-27  
7552 Melrose Ave.  
Los Angeles 46,  
California

New 1954 Edition Covers All  
Latest Developments,  
Including UHF and Color TV!



## TELEVISION SERVICING

by Walter H. Buchsbaum

All New! 2nd  
Revised Edition  
**TRANSISTORS  
COLOR  
UHF and LATEST  
TV CIRCUITS**

Get this brand-new, complete handbook for sure-fire working knowledge of TV installation, maintenance and troubleshooting. Tells you step-by-step procedures for audio IF alignment, video IF alignment, aligning RF amplifiers, mixers, oscillators, etc. If possible defects classified for ready reference, thoroughly analyzed to show what is wrong and why—and what to do to correct the defect. No mathematical knowledge needed!

Part I—Principles of TV receivers, including all new 82 channels. Latest data and illustrations on UHF tuners, converters and antennas. Separate chapter covers the new, all electronic color TV system, explains for the first time all the standards, circuits and color picture tubes. Transistors, theater TV, industrial TV, etc.

Part II—covers latest installation and alignment techniques for all receivers. Both UHF and VHF alignment data for the newest TV models are given. Antenna installation, fringe area reception and apartment house installations are described.

Part III—the trouble-shooting section. Defects are classified according to symptoms and a detailed step-by-step procedure is given for locating and repairing all possible trouble.

### USE IT 10 DAYS FREE

Coupon below brings you "Television Servicing" on FREE trial for 10 days, without obligation. Mail it NOW.

PRENTICE-HALL, INC., Dept. M-RN-1253  
70 Fifth Ave., New York 11, N.Y.

Send me, for 10 DAYS' FREE TRIAL, "Television Servicing." I will return it in ten days and pay nothing—or keep it and send \$3.95 (plus few pennies postage) in full payment.

NAME .....

ADDRESS .....

CITY..... STATE.....

SAVE! Send \$3.95 with this coupon, and we'll pay postage and packing.

RADIO & TELEVISION NEWS

## BELOW WHOLESALE!

### 12" P.M. SPEAKER

A quality speaker made by R.C.A. for use in the finest sets. Alnico V centerless ground magnet. Seamless cone. Extended Frequency Range. Voice coil 3.2 Ohms. Maximum Power Output 10 Watts. Fresh stock. WT. 3 LBS. **\$3.19 EA.** STOCK NO. L 108.

**\$3.49 EACH** LOTS OF 3

### 70° DEFLECTION YOKE



Latest design focus corrected 70° yokes at lower than wholesale cost. Can be used on all CR tubes up to 21". Inductances: 10.6 mh. Horizontal; 44 mh. Vertical. Will replace most 8 to 14 mh. yokes now in use.

**95c EA.** SHIPPING WT. 3 LBS. STOCK NO. L 107

**\$1.29 EACH** LOTS OF 3

### MALLORY INDUCTUNER

Way below wholesale cost for this popular 3-gang tuning device. Use as replacement or in your own designs for TV and FM receivers and boosters. Continuous tuning from 52-120 mc and 175-216 mc with 4 turns of shaft. Size, 4 1/4" x 2 1/4". Shaft length, 3". SHIPPING WT. 3 LBS.

**\$2.49 EACH** LOTS OF 3

**\$2.19 EA.** LOTS OF 3 STOCK NO. L 108

**CONDENSER KIT \$2.49** (See Our Advertisement)

**HARDWARE ASST. 1.89**

**RESISTOR KIT... 1.39** this issue for details)

Write for Additional Listings

INCLUDE POSTAGE—EXCESS PROMPTLY RETURNED

TERMS: F.O.B. N.Y.C.—MINIMUM ORDER \$3.00—25% Deposit on

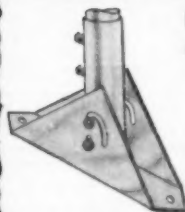
C.O.D. Orders. SAVE C.O.D. CHARGES—REMIT IN FULL

PLUS POSTAGE. EXCESS PROMPTLY REFUNDED. SUBJECT PRIOR SALE.

**PART M**

ROCKVILLE CENTER L.I., N.Y.

## South River NEWS



For ONE-MAN  
ANTENNA Roof  
Installations

**ROOF  
MOUNT**  
Model RM-15

Newly improved model enables installation man to "walk up" antenna and mast from horizontal to vertical position where they then drop and lock securely. Man is then free to guy the mast on any 10 ft. or less installation. (May also be used for higher installations.)

Features 5 1/2" long, heavy gauge steel mast holder to accommodate masts up to 1 1/2" O.D.

Embossed at all critical points for extra strength.

Heavily plated for rust resistance.

Write for new 1953 catalog.

In Can.: A.T.R. Armstrong Co., Toronto

**SOUTH RIVER METAL  
PRODUCTS CO., INC.**  
SOUTH RIVER, N.J.

PIONEER AND OUTSTANDING PRODUCER  
OF FINEST LINE OF ANTENNA MOUNTS

## Classified

Rate 50c per word. Minimum 10 words

### RADIO ENGINEERING

COMPLETE radio, electronics theory & practice: television; broadcasting; servicing; aviation, marine, police radio. 12 or 18 months. Catalog. Valparaiso Technical Institute, Dept. N, Valparaiso, Ind.

### FOR SALE

ISOLATION transformer 35w 117v sec. 117 or 135 plus 6.3v .45a tap. 3 lbs. \$2.45 plus postage. Send for flyer. Surplus bought. Empire Electronics Co., 409a Ave. L, Brooklyn 30, N. Y.

DIAGRAMS—Radio \$1.00; record changers, recorders \$1.25. Television with service data \$2.00. Where model unknown, give part numbers. Kramer's Radio Service, Dept. 853, 36 Columbus Ave., New York 23, N. Y.

TUBES and equipment bought, sold, and exchanged. For action and a fair deal, write B. N. Gensler, W2LNI, 136-F Liberty, New York 6, N. Y.

TAPE Recorders, Tapes, Accessories. Unusual Values. Dressner, 624-R East 20th St., N.Y.C. 9.

FREE, Bargain List, tubes bought, sold. Write Mark, Box 14, New York City 72.

2000 TOOLS, supplies, novelties (domestic, imported). All Tools, Box 268-R, New York 5.

ALUMINUM Tubing, angle and channel. Plain and Perforated Sheet. Willard Radcliff, Fostoria, Ohio.

RECONDITIONED TV sets, \$30. Jones, 1115 Rambler Ave., Pottstown, Pa.

COIN-OPERATED Radio. Route in Fla. Good income guaranteed. Write to P.O. Box 1443, St. Augustine, Florida.

DISCONTINUED business. Send addressed stamped envelope for list of Riders Manuals and Equipment. Marcus H. Moses, 35 Hamilton Place, New York 31.

MARINE Radio Repair Shop, lot and building. All necessary equipment. Approved for Naval Work. For further information write to Reliance Armature Works, 1721 E. Pacific Coast Hwy., Wilmington, Calif. Full Price, \$10,000.

MINIFON. Pocket recorder. Brand new. Accessories. Save, \$115. Soelngen, R. 465, RRS, Dayton 3, Ohio.

MULTIPLE Duplication tape, disc. Meters, 218 W. Olive, Fort Collins, Colorado.

USED Televisions \$30 up. W4API 1420 South Randolph, Arlington, Virginia.

TV-FM antennas. All types including UHF. Mounts, accessories. Lowest prices. Wholesale Supply Co., Dept. H, Lunenburg, Mass.

### WANTED

AN/APR-4, other "APR," "ARR," "TS," "IE," ARC-1, ARC-3, ART-13, everything surplus; Tubes, Manuals, Laboratory equipment. Describe, price in first letter. For Sale: Reconditioned Watthour Meters, four for \$10.00. Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio.

WILL buy all ART-13/type T-47A \$200.00; ART-13/type T-47, \$150.00; BC-348 unmodified \$65.00; BC-348 modified \$50.00; APN-9 \$200.00; ARC-3 complete \$600.00; R77 Receivers \$300.00; ARC-1 \$300.00; BC-312 \$60.00; BC-342 \$60.00. Ship via Express C.O.D., subject to inspection to: H. Finnegan, 49 Washington Avenue, Little Ferry, N. J.

### CORRESPONDENCE COURSES

USED Correspondence Courses and Educational Books Bought, Sold, Rented, Catalog Free. Educational Exchange, Summerville, Ga.

### MISCELLANEOUS

SPEAKERS repaired, wholesale prices, guaranteed workmanship. Ampire Speaker Service, 70 Vesey St., New York City 7.

TAPE Recording Exchange for education, amusement. Foreign Members. World Tape Pals, Box 9211, Dallas, Texas.

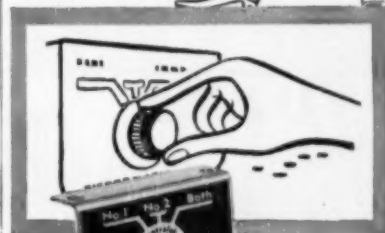
TEST Equipment Repaired and Calibrated by Factory Staff. All makes Solar, Simpson, Triplett, Heath, etc. Immediate service. Douglas Instrument Laboratory, 176 Norfolk Ave., Boston 19, Mass.

COMPLETE Speaker Repair Service. Quality Workmanship and Parts. Charles B. Albright, 12373 Pierce St., Pacoima, Calif.



## dual speaker business is good

The trend to dual speakers is greatly expanding. That's why you'll want to have the most profitable accessories on hand (or know which are fastest-for-servicing) when this business comes your way. This Centralab switch is a profitable "middle-man" everyone likes!



## this Centralab dual switch kit makes it better!

All parts (except mounting holes) in one box—nothing else to buy

You get the complete assembly for switching between dual speakers such as auto rear seat and front seat speakers, including etched dial-mounting plate and complete installation instructions. Listener selects either speaker or both. Profitably installed, you forget it! Your Centralab distributor has dual switch mounting kits on hand — order a couple NOW.

# Centralab

CENTRALAB  
A Division of Globe-Union Inc.  
9104 E. Keefe Ave., Milwaukee 1, Wis.  
Please send me Catalog 28 for additional technical data on dual switch kits.

Name \_\_\_\_\_  
Firm \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

to the

E.E. or

## PHYSICS GRADUATE

with an interest  
or experience in

RADAR or

## ELECTRONICS

Hughes Research and Development Laboratories, one of the nation's large electronic organizations, are now creating a number of new openings in an important phase of operations.

Here is  
what one of  
these  
positions offers  
you

### OUR COMPANY

located in Southern California, is presently engaged in the development of advanced radar devices, electronic computers and guided missiles.

### THESE NEW POSITIONS

are for men who will serve as technical advisors to the companies and government agencies purchasing Hughes equipment.

### YOU WILL BE TRAINED

(at full pay) in our Laboratories for several months until you are thoroughly familiar with the equipment that you will later help the Services to understand and properly employ.

### AFTER TRAINING

you may (1) remain with the Laboratories in Southern California in an instruction or administrative capacity, (2) become the Hughes representative at a company where our equipment is being installed, or (3) be the Hughes representative at a military base in this country—or overseas (single men only). Adequate traveling allowances are given, and married men keep their families with them at all times.

### YOUR FUTURE

in the expanding electronics field will be enhanced by the all-around experience gained. As the employment of commercial electronic systems increases, you will find this training in the most advanced techniques extremely valuable.

How  
to  
apply

If you are under 35 years of age  
and have an E.E. or Physics  
degree and an interest or  
experience in radar or electronics,

write

to **HUGHES**

RESEARCH AND DEVELOPMENT  
LABORATORIES

Scientific and Engineering Staff  
Culver City,  
Los Angeles County, California

Assurance is required that the relocation of the applicant will not cause the disruption of an urgent military project.

## The CBS-Colortron

(Continued from page 63)

sets in proper working order, once they have been in the field, are likewise reduced.

The aperture mask is stamped into an arched-shape and six spring clips are welded around the edges. The studs holding three of the spring clips have small v-shaped surfaces on their heads which are designed to fit over three mating domes, or hemispheres, on the inside of the faceplate beyond the picture area. These hemispheres, which are molded into the glass, precisely locate the mask in relation to the screen. The six springs are clipped over the inside lip of the metal flange which is used to attach the faceplate panel to the funnel. These clips provide a small amount of forward thrust to keep the mask pressing down on the mounting hemispheres. There is no other assembly operation to be performed except to bring the faceplate panel and the funnel together and weld their flanges around the edges. The simplicity of this method of assembly is apparent.

Considerable speculation exists as to what size and shape the color picture tube will take in its ultimate form. Up to this time, the only tubes that have been demonstrated have shown relatively small pictures by present day standards and they have been in round bulbs. This is largely because the older, flat mask type of tube becomes exceedingly difficult to design and manufacture as larger sizes are attempted. The problems already mentioned become intensified and do not appear to be a simple linear function. The problem of maintaining dynamic convergence over wider angles than those already attempted in the flat mask type of tube may be considered as almost insurmountable.

The curved mask and faceplate tube, on the other hand, already has a six to one advantage in connection with the convergence problem in the same size of bulb and with the same deflection angle. It, therefore, becomes quite apparent that this type of tube can be expected to be made in larger sizes, having deflection angles comparable to present day black and white tubes. Likewise, we can expect to see these larger size tubes in the rectangular bulb shapes. This will contribute to cabinet economies because of the more efficient use of the space within the cabinets.

In summary, the CBS-Colortron appears to be the first such color tube ideally designed for mass production on largely existing manufacturing facilities. It eliminates several components found in earlier models and achieves an improvement in contrast, as well as a simplification of circuit requirements, adjustment time, and a reduction in the amount of really serious field service problems that would be the result of drifting of convergence circuits.

New		TUBES		Standard	
Guaranteed				Brands	
0A2	\$1.00	4E27	14.50	726C	69.50
0A3/VR75	1.10	4-125A	42.50	803	3.95
0A48	1.00	4X150A	47.50	805	3.25
0B2	1.25	5BP1	4.50	807	1.65
0C3/VR105	1.00	5C23	42.00	811A	2.90
0D3/VR150	90	5FP7	1.95	813	10.95
1A2	1.00	5R42V	1.75	820B	2.75
1B22	2.00	6AK5	8.95	820B	8.95
1B23	8.05	6AL5W	1.75	830B	1.75
1B24	9.50	6AN5	2.90	832A	9.50
1B27	12.50	6AS7B	3.90	833A	29.95
1N21B	2.50	6K1000E	2.75	837	1.45
1N22	1.25	6K4	3.90	860	1.80
1N23	1.25	6L5	1.75	861	12.50
1N23B	3.25	6P17	2.95	865A	1.50
1N34A	7.95	6F57	14.95	872A	2.75
1N38	1.50	6K60/1641	2.95	874	1.10
1N58A	1.25	6V-127A	2.95	884	1.40
1N63	2.15	1007H	9.50	931A	8.50
1N65	69	2507H	16.90	954	.33
1N70	2.95	3947L	7.95	955	.49
2C30	12.50	307A RK75	3.95	956	.49
2C40	8.50	394A	3.95	958A	.69
2C51	4.50	417A	8.90	989	1.95
2D21	1.25	446A	1.19	991	.39
2E22	1.95	4507H	44.90	1005	.89
2E24	4.65			1616	.90
2E25A	4.50			1625	.89
2K22	22.50			1628	.95
2K25	28.50			2050	1.40
2K26	28.50			2051	1.75
2K41	125.00			50-15	2.90
2K45	110.00			50-33	3.75
3A4	75	12-32	10.00	5702	2.95
3B20	1.25	100-20	14.50	5703	2.95
3C22	72.50	703A	4.90	5728	2.00
3C23/246	1.50	703A	4.90	5734	1.75
3C33	9.95	707A	8.95	5844	4.50
3C45	12.50	707A	13.95	5851	3.75
3E20	11.95	715A	9.50	A020	1.25
3FP7	1.95	715B	14.95	803A	3.95
3HP1	3.95	715C	14.95	9001	1.25
3HP7	3.95	717A	8.90	9002	.98
4C27	12.50	723B	16.95	9003	1.50
4C28	39.00	724B	2.75	3-200A	.49
4C35	19.50	726B	45.00	3-592	22.50

Complete line of Receiving Tubes. Thousands of other types of Transmitting Tubes. If you need them, WRITE. Prices subject to change without notice. Californians add sales tax. Add postage to order.

### VEEDER ROOT COUNTER

5 figure. Adds ten for each revolution of shaft in one direction; subtracts ten for each revolution in opposite direction. Size 2 1/2" x 3 1/2" x 1" dovetail mounting; lever arm removable.

ONLY 1.25 ea.

Quantity Discounts



**Jsh**  
SALES CO.

**ELECTRONICS**  
Dept. R-27  
7552 Melrose Ave.  
Los Angeles 46,  
California

New 1954 Edition Covers All  
Latest Developments,  
Including UHF and Color TV!



TELEVISION  
SERVICING

**TELEVISION  
SERVICING**  
by Walter H. Buchsbaum

All New! 2nd  
Revised Edition  
**TRANSISTORS**  
**COLOR**  
UHF and LATEST  
TV CIRCUITS

Get this brand-new, complete handbook for sure-fire working knowledge of TV installation, maintenance and trouble-shooting. Tells you step-by-step procedures for audio IF alignment, video IF alignment, aligning RF amplifiers, mixers, oscillators, etc. All possible defects classified for ready reference, thoroughly analyzed to show what is wrong and why... and what to do to correct the defect. No mathematical knowledge needed!

Part I—Principles of TV receivers, including all new 82 channels. Latest data and illustrations on UHF tuners, converters and antennas. Separate chapter covers the new, all electronic color TV system, explains for the first time all the standards, circuits and color picture tubes. Transistors, theater TV, industrial TV, etc.

Part II—covers latest installation and alignment techniques for all receivers. Both UHF and VHF alignment data for the newest TV models are given. Antenna installation, fringe area reception and apartment house installations are described.

Part III—the trouble-shooting section. Defects are classified according to symptoms and a detailed step-by-step procedure is given for locating and repairing all possible trouble.

### USE IT 10 DAYS FREE

Coupon below brings you "Television Servicing" on FREE trial for 10 days, without obligation. Mail It NOW.

**PRENTICE-HALL, INC., Dept. M-RN-1253**  
70 Fifth Ave., New York 11, N.Y.

Send me, for 10 DAYS' FREE TRIAL, "Television Servicing." I will return it in ten days and pay nothing—or keep it and send \$5.95 (plus few pennies postage) in full payment.

NAME .....

ADDRESS .....

CITY ..... STATE .....

SAVE! Send \$5.95 with this coupon, and we'll pay postage and packing.

RADIO & TELEVISION NEWS

# 1953 INDEX VOLUMES 49-50

As a service to our readers we are again presenting a complete listing of all feature articles which appeared in RADIO & TELEVISION NEWS during 1953. We suggest you keep this for reference.

## AMATEUR

### ANTENNAS

- A Multi-Band, Constant Impedance Antenna (Graf, W5LFM)..... 72 Sept.  
Improved 10-Meter Mobile Antenna (Hartgrove, W4BSO)..... 172 Dec.  
The Broomstick Boomstick (Wagner, W6WGD)..... 116 Mar.  
3-Element 14 mc. Rotary Beam Antenna (West, W2IYG)..... 66 Feb.

### CONVERTERS

- "Converterless" 75-Meter Mobile Reception (Shannon, VE7AGE).... 174 Sept.

### MISCELLANEOUS

- A Better Electronic Key (Gallagher, W5HZB)..... 52 Jan.  
A Compact Bandswitching V.F.O. Multiplier (Snader, W0ZFO)..... 52 Feb.  
A \$5 Low-Pass Filter (Rountree, W5CLP)..... 47 June  
A New V.F.O. (Wilson, W5DAD)..... 107 Nov.  
A Noise Limiter Deluxe (Hoeler, W0III)..... 76 May  
A Plug-in Modulator (Taylor, W8NAP)..... 77 Dec.  
A "Small-Package" Modulator (Brauner, W2URF)..... 103 Nov.  
A Transistor Code Practice Oscillator (Garner)..... 40 Apr.  
A 200 mc. R.F. Amplifier (May, W5AJG)..... 68 Dec.  
Break in Without Relays (Brown, W6TWW)..... 55 Sept.  
Hints and Kinks for Mobileers (Najork, W2HNH)..... 84 Aug.  
Modernize Your "Bug" (Clemens, W9ERN)..... 39 Apr.  
QRM-Cutting Selectivity for the Mobile Receiver (Brown, W2CVV) 60 May  
Reviving the Jam-Jar Rectifier (Robberson)..... 61 Dec.  
Speech Filters for Amateur Receivers (French, W1JKZ)..... 74 Sept.  
Simplified Crystal I.F. Filter (Cameron, W8IVI)..... 144 Nov.  
6BQ7A Cascode 10-Meter Preamp (Lowinsbury, Jr., W2QKA)..... 129 Nov.  
The Monimeter (Brodersen, W6CLV) 47 July  
The "Transdipper" (West, W2IYG). 60 Oct.  
Transistor Band Spotter (Sulzer, W3HFW)..... 52 June  
25-Watt Utility Unit (Anglado).... 66 Jan.  
Why Use a Condenser? (Wagner, W6WGD)..... 40 June

### TRANSMITTERS

- A Midget Self-Contained 15-Watt Transmitter (Shalna, W2LBU).... 66 Apr.  
A "Minimum" Mobile for 10-Meter CD (Finkbeiner, W8AQK)..... 52 July  
A Simple Facsimile System for the Amateur (Roberts)..... 45 Dec.  
Footproof 2-Band Transmitter (Cameron, W8IVI)..... 116 Dec.  
Inexpensive Novice Station (Part I) (Trombly, W0DCB & Hathaway, W0GTK)..... 52 Sept.  
Modernizing the SCR-274/N Transmitter (Hays, W6RTP)..... 58 Jan.

December, 1953



## Prescribed by top mfrs.

For operating and testing DC equipment from AC lines



**Electro**  
ELECTRONIC EQUIPMENT

**FILTERED  
DC POWER SUPPLY**  
Pat. 2399748

Model B

They say: "It's the only one that can withstand continuous high overloads!"

**Cooler Operation**—Selenium rectifier application and conduction cooling dissipate over 3 times the heat.

**Twice the Rectifier Power Rating** with EPL Patented Design. **Lowest Cost Per Ampere Output.**

**Output** 6v., 1-20 amps. (35 at peak). 2 units in parallel supply 6v. at 40 amps.

**Tests 2 Auto Radios** with push-button solenoids at same time; also motors, instruments, relays, other low voltage devices.

**NEW MODEL C-12** services both 12v. and 6v. auto radios.

\* Names on request

**ELECTRO PRODUCTS LABORATORIES**  
4501-ND Ravenswood Avenue Chicago 40, Ill.

Canada: Atlas Radio Corp., Ltd., Toronto, Ont.

**FREE!** New Detailed Literature on America's Only Complete Line!

**MODEL CR-200**



Another First by

# MILLER

TELEVISION CO.

Install in 30 seconds.  
Comes completely pre-assembled.

## UHF Bow-tie Corner Reflector



**JOHN MILLER**  
"The Man Who Knows"

A rugged antenna that comes completely pre-assembled. Install in 30 seconds by merely opening like a book. Broad band on all UHF channels. Especially effective in difficult installations. Reflector screen of 1/4" aluminum elements with aluminum channel rim. Featuring the new Miller unbreakable UHF molded hi-impact styrene insulator. As with Miller's complete line of realistically priced UHF and VHF antennas, Model CR-200 is ready for immediate delivery with a money back guarantee. Another first from Miller Television... the West's pioneer producer of television antennas.

**LIST PRICE \$8.95**

More than 1 million antennas built since 1948



### WRITE FOR FREE CATALOG

Miller Television Co., 2840 Noomi  
Burbank, Calif.  
Gives complete information on Miller UHF and VHF antennas.  
Write for your copy today, and name of nearest jobber.

NAME.....  
ADDRESS.....  
CITY & STATE.....



How Many Watts? (Tanner).....	65 Nov.
Increased Profits from Custom Building (Ledbetter).....	48 Nov.
Mac's Radio Service Shop (Frye)...	84 Nov.
Railroad Yard Loudspeaker Systems (Sands).....	5i Nov.
The Asco "Audiomat" (Greene)....	58 May
The "Compleat Fidelity" (Part 1) (Drenner).....	57 Nov.
The "Compleat Fidelity" (Part 2) (Drenner).....	52 Dec.
The "Electronorgan" (Part 1) (Dorf).....	60 Nov.
The "Electronorgan" (Part 2) (Dorf).....	78 Dec.

#### PHONO

Counterbalanced Pickup Arms (Dollen).....	50 Nov.
Feedback Preamp for Low-Impedance Pickups (Grey).....	66 Nov.
New Developments in Phono Equalizers (Boegli).....	54 Apr.
String-Belt Turntables (Taylor)...	68 Mar.

#### RECORDING

A Dual Channel Recording System (Part 1) (Read).....	43 Nov.
A Dual Channel Recording System (Part 2) (Read).....	53 Dec.
Binaural Sound Reproduction (Southworth).....	71 Mar.
Counter Improves Tape Recorder (Dorf).....	51 Sept.
Demagnetizer (Mandl).....	42 Jan.
4-Channel Continuous Recorder-Reproducer.....	100 June
High-Quality Record Reproduction at Low Cost (Yonker).....	64 Aug.
Pages from a Tape Editor's Notebook (Part 1) (Hoefler).....	46 Nov.
Pages from a Tape Editor's Notebook (Part 2) (Hoefler).....	50 Dec.
The Diminutive Wire Recorder (Sampson).....	38 May

#### SPEAKER HOUSINGS

An Improved Corner Horn Speaker System (Augsburger).....	48 Feb.
Building the E-V Regency (Souther).....	50 Aug.
Electro-Voice Aristocrat (Souther)...	64 June
Electro-Voice Baronet.....	57 May
EW Speaker Enclosure (Holzman)...	43 July
Improving the "Fold-a-flex".....	68 Nov.
Loudspeaker Enclosures (Stocklin)...	43 May
"Super Horn"—A Folded Horn Enclosure (Gately, Jr. & Benham)...	38 Sept.
The "Fold-a-flex" (Reed).....	67 Oct.
The Klipsch Rebel IV—A Back-Loading Folded Corner Horn (Kantor).....	48 Oct.
The Purist—A Non-Corner Horn (Gately, Jr. & Benham).....	56 Dec.
The R-J Speaker Enclosure.....	53 Apr.
The Ultrasonic U-25 Enclosure (Reynolds).....	83 Nov.

#### TONE CONTROLS

Loudness Control (Eskowski).....	54 Oct.
Phase-Shift Tone Controls (Southworth).....	56 Jan.
The "Compentrol"—A Compact Loudness Attenuator (Wiener & Nelson).....	79 Nov.

#### BOOK REVIEWS

Audio Amplifiers and Associated Equipment (Sams Staff).....	108 Oct.
Auto Radio Service Data Manual (Vols. 2 & 3) (Sams Staff).....	109 Oct.
Basic Electronic Test Instruments (Turner).....	143 Apr.
British Radio Components.....	126 Sept.
Data and Circuits of Modern Receiving and Amplifying Valves (Markus & Otte).....	156 Feb.

December, 1953

## HARVEY AUTHORIZED DISTRIBUTORS



**RCA Tubes and Harvey Service...  
For Double Dependability!**

HARVEY's line of RCA tubes is so complete, that HARVEY can fill virtually any requirement... right from stock... and deliver at almost a moment's notice.

This is particularly important to AM, FM, and TV Broadcasters, Industrial and Commercial users, Amateurs, and Service-Technicians, all of whom depend on tubes for sustained operation of important electronic equipment.

Write, Wire, or Phone,  
for  
Prompt Harvey Service.

 **Harvey**  
RADIO CO., INC.

103 W. 43rd St., N. Y. 36, N. Y. • JU 2-1500

### Unlimited Opportunities in RADIO ENGINEERING

#### DEGREE IN 27 MONTHS

Complete Radio Engineering course, including Telev., E.I.R., and F.M. Bachelor of Science Degree also in Mech., Civil, Elect., Chem., and Aero. Eng.; Bus. Adm., Acct. Extensive campus, modern buildings, well equipped labs. Low cost. Prep courses. Personalized, practical instruction. Founded 1884. Placement service. Growing shortage of engineers. Prepare now for unlimited opportunities ahead. Approved for Korean vets. Enter January, March, June, September. Write for catalog.



**TRI-STATE COLLEGE**

16123 College Avenue, ANGOLA, INDIANA

#### ANOTHER OUTSTANDING JOBBER

### NIDISCO

715 Newark Ave.  
Jersey City, N. J.

38 State St.  
Hackensack, N. J.

658 Anderson Ave.  
Cliffside, N. J.

294 Passaic St.  
Passaic, N. J.

126 So. Warren St.  
Trenton, N. J.

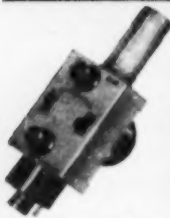


\$12.95

#### HAS THE SENSATIONAL NEW

**EICO** 495-K SCOPE VOLTAGE  
CALIBRATOR KIT  
IN STOCK!

## TV SERVICE ESSENTIALS



### No. MA-4 Pocket Size Bar Generator

Provides actual bar pattern on TV receiver screen, portable and lightweight for on the spot linearity adjustments. Can be used when no stations are on the air to produce adjustable number of horizontal or vertical lines. Plugs in picture tube.

\$10.25 List Price

### No. MA-4-AF Deluxe Bar Generator

Completely self-powered pocket size Bar Generator. Obtains operating power from wall outlet. Useful on all TV sets provides servicemen with a foolproof pocket sized Bar Generator that produces an adjustable number of horizontal or vertical lines. Plug-in unit.

\$24.95 List Price



### Picture Tube rejuvenators

Renews brightness of low emission CRT. 400 for magnetic or electrostatic CRT, parallel filaments.

\$2.75 List Price

40C For standard focus CRT, parallel filaments.

\$2.50 List Price

500 For magnetic or electrostatic focus, series filaments.

\$3.40 List Price

51E Isolation rejuvenator for weak CRT having inter-element leakage. For any CRT using parallel filaments.

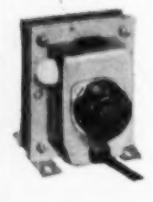
\$3.80 List Price

### No. LVB-117 Line Voltage Booster

Corrects for low or high line voltage. 250 watts, for line voltages from 90 to 135 volts. Multi-tap selector and neon indicator for exact voltage boost. Fused to protect against unsafe voltage increases.

\$17.95 List Price

No. 3023 LVB is (not shown) Budget Priced 250 watts, for 10 volt boost or straight through line. Priced for economy \$8.75 List



### No. 200K Variable Inductance, Universal Substitution Kit

For video, IF circuits; 8 variable coils cover range from 1 to 580  $\mu$ h. Q Max Impregnation. Data enclosed on L min, L max, Q, R, C dis. Res. free. Individual calibration charts permit adjustment without test equipment.

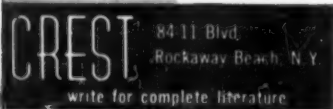
\$7.95 List Price



### No. 10A Multi-Channel Converter

Pre-tuned for single channel application. Adjustable over 15 channel range without use of instruments. Double tuned, silver plated, high Q pre-selector. Single switch for on-air, VHF-UHF. Model 10A obtains its power from receiver through octal adaptor plug. Model 10B complete as above but with 7 Pin adaptor plug.

\$22.50 List Price



Electrical Fundamentals of Communication (Albert) .....	155 Feb.
Electronic Circuitry for Instruments and Equipment (Aronson) .....	126 Sept.
Electronics Everywhere (Low) .....	173 Mar.
Elements of Electricity (Timble) .....	126 Sept.
Essentials of Microwaves (Muchmore) .....	155 Feb.
Hearing Aids, Their Use, Care and Repair (Mandl) .....	103 July
High Fidelity Simplified (Weiler) .....	156 Feb.
Home Music Systems (Canby) .....	150 June
How to Build Instruction Manual (Thordarson-Meissner) .....	145 Apr.
Introduction to Valves (Hollows) .....	88 Dec.
Learning the Radiotelegraph Code (ARRL Staff) .....	89 Dec.
Linear Scale Non-Logarithmic Slide Rules (Groder) .....	156 May
Most-Often-Needed 1953 Television Servicing Information (Beitman, ed.) .....	156 May
Most-Often-Needed 1953 UHF Converters and Tuners (Beitman, ed.) .....	109 Oct.
New Screen Techniques (Quigley, Jr., ed.) .....	108 Oct.
Photoelectric Tubes (Sommer) .....	173 Mar.
Pix-O-Fix TV Troubleshooter Guide (Ghirardi & Middleton) .....	103 July
Principles and Practices of Telecasting Operations (Ennes) .....	126 Sept.
Principles of Television Servicing (Rabinoff & Wolbrecht) .....	144 Apr.
Principles of Transistor Circuits (Shea, ed.) .....	88 Dec.
Producing and Directing For Television (Adams) .....	230 Nov.
Radio Amateurs' Mobile Handbook (Orr, W6SAI) .....	109 Oct.
Radio Operating Questions and Answers (Hornung & McKenzie) .....	172 Mar.
Radiotron Designer's Handbook (Langford-Smith, ed.) .....	70 Aug.
Remote Control By Radio (Bruinsma) .....	143 Apr.
Sim Barton, Girl Radio Operator (Cloutier, W8GIX) .....	173 Mar.
Sound Reproduction (Briggs) .....	149 June
Television (Kerkhof & Werner) .....	144 Apr.
Television Advertising and Production Book (Settel, Glenn & Associates) .....	230 Nov.
Television & FM Receiver Servicing (Kiver) .....	88 Dec.
Television and Radio Repairing (Markus) .....	108 Oct.
Television Fundamentals (Fowler & Lippert) .....	88 Dec.
Television Interference (Rand, ed.) .....	230 Nov.
Television Receiver Design I (Uijtens) .....	103 July
The Radio Amateur's Handbook (ARRL Staff) .....	156 May
Thermionic Vacuum Tubes and Their Applications (Aldous & Appleton) .....	157 Feb.
TV Manufacturers' Receiver Trouble Cures (Vol. 1) (Snitzer, ed.) .....	144 Apr.
TV Manufacturers' Receiver Trouble Cures (Vol. 2) (Snitzer, ed.) .....	103 July
TV Manufacturers' Receiver Trouble Cures (Vol. 3) (Snitzer, ed.) .....	70 Aug.
TV Manufacturers' Receiver Trouble Cures (Vol. 4) (Snitzer, ed.) .....	109 Oct.
TV Servicing Short-Cuts (Kiver) .....	150 June
TV Sweep Alignment Techniques (Liebscher) .....	70 Aug.
TV Test Instruments (Kiver) .....	149 June
UHF Antennas, Converters, and Tuners (Kiver) .....	72 Aug.
UHF Converters (Sams Staff) .....	149 June
UHF Practices and Principles (Lytle) .....	172 Mar.
UHF Television (Noll) .....	230 Nov.
Vacuum Tube Oscillators (Edson) .....	156 May
Vade-Mecum (Brans, ed.) .....	103 July

**ONLY \$4.95**  
Fed. or C.O.D. + Chgs.

**THE NEW TV DYNATRACER**

- TRACES TV SIGNALS AND VOLTAGES
- LOCATES DEFECTIVE COMPONENTS
- REQUIRES NO ADDITIONAL EQUIPMENT

This sensational new piece of test equipment is ideal for trouble-shooting television sets in the home or in the shop. The "DYNATRACER" will out-perform more expensive testers and should pay for itself on the very first repair.

**A Must for Every TV Technician**

**SPECIFICATIONS:** The "DYNATRACER" is a self-powered quality test instrument designed to trace TV signals through any Video, Sound, Sync, APC, Horizontal or Vertical Sweep Circuit—will isolate trouble to a stage or component.

**ADDED FEATURE:** The "DYNATRACER" will also trace voltages (30-500 V. AC/DC) and instantly locate open, shorted, intermittent or leaky (up to 20 MEGOHMS) condensers, resistors, coils, X-formers, etc.

**Instruction and Trouble-Shooting Book Enclosed**

**10 DAY MONEY-BACK GUARANTEE**

Cut out advertisement, attach name and address with \$5.00 bill, check or money order and mail to

**Century ELECTRONICS CO.**  
8509-21st Ave., Dept. 208, Brooklyn 14, N. Y.

**Sound Powered Phones—Government Surplus**  
No Batteries or External Power Source Needed

**TS-10 TYPE HAND KEY**  
Brand New. Excellent Response to low tones. Includes 3 ft. cord. .... \$9.48

**NAVY TYPE 80 HEAD AND CHEST SET.** Heavy duty. Brand New. For work requiring free use of hands. Includes 2 ft. cord. .... \$14.88

FOR PHIL. Send for our Latest Bargain Catalog  
**RELIANCE MERCHANDISING CO.**  
2219 Arch St. Phila. 3, Pa.

**AUDELS TV-RADIO SERVICE LIBRARY**

HERE IS LATE INFORMATION IN A HANDY FORM FOR RADIO & TELEVISION REPAIRMEN, SERVICEMEN & STUDENTS

**AUDELS RADIO MANS GUIDE**  
COVERING THEORY SERVING TELEVISION ELECTRONICS

**AUDELS TELEVISION SERVICE MANUAL**

**2 VOLS. \$6 COMPLETE \$14.95**  
**17 PAYS TO KNOW!**

AUDELS TV-RADIO SERVICE LIBRARY presents the important subjects of Modern Radio, Television, Industrial Electronics, F.M. Police Address Systems, Auto, Marine & Aircraft Radio, Phonograph Pick-Ups, etc. Covers Basic Principles—Construction—Installation—Operation—Repairs—Trouble Shooting. Shows How to get Sharp, Clear T.V. Pictures. Install Aerials—How to Test. Explains Color Systems & Methods of Conversion. 1661 Facts—Over 1260 Pages—625 Illustrations—Parts & Diagrams—Valuable for Quick Ready Reference & Home Study. Tells How to Solve T.V. & Radio Troubles—Answers T.V. & Radio Questions.

Get this information for Yourself.  
**7 DAY TEST—ASK TO SEE IT!**

**MAIL ORDER**

**AUDEL Publishers, 49 W. 23 St., N. Y. 10**  
Mail AUDELS TV-RADIO SERVICE LIBRARY 2 Vols. \$6 on 7 days free trial. N.O.M. I will remit \$1 in 7 days and \$1 monthly until \$6 is paid. Otherwise I will return them.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Occupation \_\_\_\_\_  
Employed by \_\_\_\_\_

## BUSINESS MANAGEMENT

Specialize—For Profit (Johnson)...	90 May
Radio-TV Service Industry News...	146 Jan.
Radio-TV Service Industry News...	104 Feb.
Radio-TV Service Industry News...	138 Mar.
Radio-TV Service Industry News...	154 Apr.
Radio-TV Service Industry News...	142 May
Radio-TV Service Industry News...	154 June
Radio-TV Service Industry News...	130 July
Radio-TV Service Industry News...	120 Aug.
Radio-TV Service Industry News...	162 Sept.
Radio-TV Service Industry News...	113 Oct.
Radio-TV Service Industry News...	208 Nov.
Radio-TV Service Industry News...	132 Dec.

## GENERAL

### CIRCUITS (THEORY)

Care of Transistors (Turner, K6AI)...	40 Feb.
Obtaining Transistor Characteristic Curves (Philbrook) .....	66 Sept.
Selenium Diode Applications (Cataldo) .....	64 Sept.
Transistor Physics Simplified (Part 1) (Gentile & Barotta) .....	44 July
Transistor Physics Simplified (Part 2) (Gentile & Barotta) .....	46 Aug.

### MISCELLANEOUS

An Electronic Home Temperature Control (Lawson) .....	130 Nov.
An Electronic Metronome (Wortman) .....	182 Oct.
A Photoelectric Headlight Dimmer (Vogelgesang) .....	35 Jan.
Assemble Your Own Hearing Aid (Louis) .....	46 Sept.
A Sound-Actuated Electronic Switch (Lewis) .....	120 Nov.
A Transistor "Electric Organ" (Garner) .....	64 July
A Transistor Timer (Garner) .....	68 Oct.
Automatic Input Switching Without Relays (Fettes) .....	70 Sept.
A Vibration-Pickup Amplifier (Garner) .....	48 Jan.
Build This Electronic Flash (Hellman) .....	52 Mar.
Certified Record Revue (Whyte)...	58 Sept.
Certified Record Revue (Whyte)...	70 Oct.
Certified Record Revue (Whyte)...	70 Nov.
Certified Record Revue (Whyte)...	70 Dec.
Electronic "Butler and Babysitter" (Lipman) .....	43 Aug.
Electronic Counter (Levey) .....	43 Sept.
Electronics for the Yachtsman (Ashley) .....	67 Aug.
Electronic Light Control (Seizke, W9LFZ) .....	81 Dec.
Electronic Shipyard for Winter Cash (Robberson) .....	57 Oct.
Fun with a Home-Built Electronic Organ (Kirk, W6DFG, W6JIK) ..	59 Mar.
Inexpensive Applause Meter (Barbee) .....	67 Dec.
Installing Mobile Equipment (Johnson, W5RPO) .....	62 Mar.
Lie Detector (Bohr) .....	56 June
Lincoln Tunnel Traffic Control .....	188 Oct.
Mac's Radio Service Shop (Frye) ..	62 July
Mac's Radio Service Shop (Frye) ..	78 Sept.
Make Your Electronic Flash More Versatile (Proctor) .....	126 Oct.
Model Boat for the 27 mc. Citizens Band (Smith, W8VVD) .....	35 Mar.
Simple Sound Effects for Home Movie Makers (Darr) .....	98 Sept.
There's Cash Afloat (Robberson) ..	35 May
Time Compressor .....	96 June
"Timothy"—A Robot Electronic Turtle (Kubanoff) .....	35 Apr.
Transistor-Operated Photocell Relay (Garner) .....	64 May
Unrecognized Hazards in Electronics (Hughes) .....	96 Apr.
Using a Transistor to Increase Relay Sensitivity (Garner) .....	39 June

Spot TV trouble symptoms at a glance  
... fix them twice as fast!

# Now! HANDLE UP TO 90% OF TV SERVICING BY PICTURE ANALYSIS

New short cut way of handling television service can save you hundreds of dollars worth of time



## PIX-O-FIX TV TROUBLE FINDING GUIDE

By Ghirardi & Middleton

- 24 COMMON television troubles identified by actual TV screen photos.
- 190 POSSIBLE causes of these troubles identified and localized to the particular stage of the receiver where they are most likely to occur.
- 253 DEFINITE, easily understood remedies for these troubles.
- 4,500 WORDS in CAUSE and REMEDY section to explain exactly what to do.

### FAST! EASY TO USE!

Hours of tedious, time-consuming troubleshooting can be cut to minutes. Repairs can be made twice as fast! Just "dial" the new Ghirardi PIX-O-FIX TV TROUBLEFINDER GUIDE until the actual TV screen photo appearing in its "window" matches the screen picture on the defective set you are repairing. The proper Trouble Key Number also appears on the guide. This directs you to the tabulation giving all possible causes of this particular trouble and the stage or section of the receiver in which it is most likely to occur.

But this only the beginning! The Pix-O-Fix Guide not only helps you locate the trouble quickly but it also shows you exactly how to fix it. Step-by-step repair instructions follow. In most cases, the particular component most likely to be faulty is specified. Quick tests to apply to it are explained. If part substitution is likely to be more effective than an instrument test, this is recommended.

### COVERS ALL MODELS!

PIX-O-FIX is applicable to all television receivers. Operation is clear and simple. Money-back guarantee if you're not more than satisfied!

**NOTE!** Ghirardi's PIX-O-FIX is designed and sold as a professional TV service device for servicemen—NOT as a "fix-it-yourself" gadget for use by consumers.

**Only \$1. 10 DAY Money back Guarantee**

Dept. RM-123, Rinehart Books, Inc., Technical Div.  
232 Madison Ave., New York 16, N. Y.

Enclosed is \$1 for which please rush a PIX-O-FIX TROUBLE FINDER GUIDE. If not satisfactory, I will return it postpaid within 10 days and you guarantee to refund my \$1.

Name .....  
Street .....  
City, Zone, State .....  
PRICE OUTSIDE U.S.A. \$1.25 cash—same return privilege.

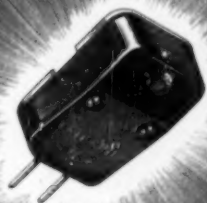
ENJOY THE FULL RICHNESS  
OF FULL FREQUENCY RECORDING...

The  
**FAIRCHILD**

SERIES 215

**HIGH-COMPLIANCE**

Diamond Cartridge



NOW ONLY  
**\$37.50**

WITH FINEST  
DIAMOND STYLUS

This amazing new cartridge, a radical departure from ordinary cartridge design, achieves near-zero mass of stylus assembly. The result is **HIGH COMPLIANCE**—accurate, distortion-free tracking which reproduces without listening fatigue the full, rich tonal qualities of the most sensitive recordings.

"Amazed at new purity of sound... clarity... distinctness of orchestral texture... which all add up to something fabulously beautiful!" says B. H. Haggin, noted Record Reviewer.

**FAIRCHILD RECORDING EQUIPMENT**

8th Ave. & 154th St.,  
Whitestone, N. Y.

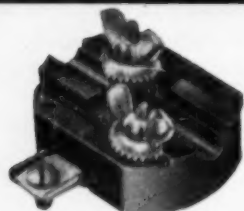
Manufacturers of the World's Finest Professional Sound Equipment

ORDER FROM YOUR  
AUDIO DEALER  
or mail coupon for  
FREE folder

Without obligation, please mail FREE folder, "HI-FI FACTS for the Music Lover"

Name .....  
Address .....  
City ..... State .....  
.....

# NEW!



## LIGHTNING ARRESTOR



**HOLDS EVERY COMMON TYPE OF TRANSMISSION LINE**



Now! No stripping of insulation, no straps or ears to break off, no signal loss—and no "misses." This new Lightning Arrester by iE reduces your installation problems—and inventory, too! Easily installed indoors or outdoors. **Model 4000** for walls and windows, etc. **Model 4003** with stainless steel strap for pipe mounting.



Write for details & new iE catalog  
**325 N. HOYNE AVE.  
CHICAGO 12, ILL.**

V.H.F. Communications in Korea (Gould) ..... 35 June  
Writing for Profit and Prestige (Garner) ..... 59 Feb.

### POWER SUPPLIES

An Adjustable Regulated Voltage Supply (Hoefler, WQIII).....170 Oct.  
Improved Variable Power Supply (Creviston) ..... 42 Apr.  
Multi-Voltage Power Supply (Wilcox) .....134 Nov.  
Selenium D.C. Voltage Regulators (Braverman) .....158 Oct.  
Use Your Defective TV Transformers (Setzke) .....178 Oct.

### SHORT-WAVE

Short-Wave (Boord) ..... 61 Jan.  
Short-Wave (Boord) ..... 65 Feb.  
Short-Wave (Boord) ..... 74 Mar.  
Short-Wave (Boord) ..... 69 Apr.  
Short-Wave (Boord) ..... 74 May  
Short-Wave (Boord) ..... 69 June  
Short-Wave (Boord) ..... 66 July  
Short-Wave (Boord) ..... 68 Aug.  
Short-Wave (Boord) ..... 75 Sept.  
Short-Wave (Boord) ..... 82 Oct.  
Short-Wave (Boord) .....132 Nov.  
Short-Wave (Boord) ..... 86 Dec.

### INDUSTRY

Boeing Electrical Circuits Made by Etching Process (Petite).....140 Nov.  
Electronics Goes to the Fair (Burdette) ..... 73 Sept.  
Philadelphia's New Mobile Unit (Grim) ..... 51 Mar.  
Radar Protects Fishing Fleets (Frank, W9JU) ..... 35 July  
The Oracac (Geyer) ..... 83 Oct.

### TELEVISION

**ANTENNAS**  
A Multiple Installation for TV Receivers (Fulmer) ..... 50 Mar.  
Antenna Measurements (Harris & Greenberg) ..... 62 Apr.  
For Fringe Areas (Dines)..... 52 May  
Maintenance of TV Antennas (Bettan & Price) ..... 39 Mar.  
TV Signal Distribution Methods (Noll) ..... 46 Feb.  
U.H.F. Antennas (Part 2) (Kiver).... 36 Jan.  
U.H.F. Antennas (Part 3) (Kiver).... 56 Feb.  
U.H.F. Antennas (Part 4) (Kiver).... 54 Mar.  
U.H.F.-V.H.F. Antenna Coupler (Finkel & Sarayiotos)..... 63 May  
V.H.F. Fringe Antennas (Buchsbaum) ..... 50 Apr.  
V.H.F.-U.H.F. Antenna Design (Carini) ..... 42 Feb.  
You and U.H.F. (Schulman)..... 48 Mar.

### MISCELLANEOUS

Color TV (Part 1) (Feingold)..... 51 Oct.  
Color TV (Part 2) (Feingold)..... 99 Nov.  
Current TV Topics (Buchsbaum).... 50 Feb.  
Film for TV (Seitz)..... 35 Aug.  
Mac's Radio Service Shop (Frye).... 72 Dec.  
New "Pay-as-You-Watch" System... 93 Aug.  
New TV Grants Since Freeze Lift... 70 Feb.  
New TV Grants Since Freeze Lift... 76 Mar.  
New TV Grants Since Freeze Lift... 74 Apr.  
New TV Grants Since Freeze Lift...148 May  
New TV Grants Since Freeze Lift... 84 June  
New TV Grants Since Freeze Lift... 75 July  
New TV Grants Since Freeze Lift... 16 Aug.  
New TV Grants Since Freeze Lift... 16 Sept.  
New TV Grants Since Freeze Lift...166 Oct.  
New TV Grants Since Freeze Lift...160 Nov.  
New TV Stations on the Air.....148 Mar.  
New TV Stations on the Air.....110 Apr.  
New TV Stations on the Air..... 86 May  
New TV Stations on the Air.....124 June

## STAN-BURN 5-PARKS

### \*CATHODE RAY TUBE SPECIALS\*

One Year Guarantee	
G. E.	STAN-BURN
*STP4.....\$44.95	10BP4.....\$11.00
*7JP4.....17.10	12LP4A.....14.20
*10BP4A.....19.25	14CP4.....17.00
*10FP4A.....24.00	15DP4.....19.50
*12KP4A.....27.10	16AP4.....21.60
*12LP4A.....21.70	16FP4.....19.60
*12UP4B.....28.25	16GP4.....21.60
*14CP4.....24.50	16HP4A.....22.60
*16AP4A.....30.95	16DP/HP4.....19.60
*16DP4A (N.U.).....28.20	16DP/HP4A.....20.60
*16GP4.....31.25	16KP4.....18.50
*16KP4/16RP4.....28.20	16LP4A.....21.60
*17BP4A.....23.90	16LP4A.....21.60
*17CP4.....23.90	17BP4A.....18.50
*19AP4A.....39.45	17CP4A.....21.60
*20CP4.....32.50	19AP4.....23.90
*20LP4.....37.50	19AP4A.....25.90
*21EP4A.....37.35	20CP4.....29.50
*24AP4A.....78.50	21EP4.....32.50

### ANTENNAE SPECIALS

*RED DOUBLE "H" Antenna.....\$3.19	6 or more \$1.98
*10 ELEMENT CONICAL DOVEELED INSERTS.....2.98	2.79
*Folded Hi Straight Low Quick Rig 1/2" elements.....4.25	3.25
*WINDOW CONICALS 6 FOOT SWEGGED.....4.95	3.75
*MASTS 10 FOOT PLAIN.....1.39	1.29
*NEPCO MASTS 1.65	1.40
*TV WIRE 85 Mil. 300 OHM.....\$ 9.95 M FL.	
72 OHM COAXIAL.....11.95 M FL.	35.00 M FL.

\*12" Heavy Slug Speaker.....Special \$3.98  
\*CHASSIS 630 TECH-MASTER.....\$149.50  
\*OPEN FACE CABINET.....42.00

### WIRE RECORDERS IN STOCK

\*PENTRON - Model 9T3C - 2-speed Tape Recorder.....Write for Price.  
\*RADIO CRAFTSMAN Model C400-Hi-Fi Amplifier.....Net 42.90  
Model C10-Ali-FM Tuner.....Net 23.90  
Model C500-Williamson Amplifier.....Net 99.50  
We also carry MASCO-BOGEN-PILOT, etc. Amplifiers, Pre-Amps, FM Tuners and WESTER Tape Recorders.  
\*6x8 PM Speaker...\$ 3.98 630 Vert. output potted.....1.29  
\*7" PM Speaker...3.98 630 Vert. Blocking OSC. XForm......89  
\*7711 G.E. Flyback 1.98 Cascade Tuners.....1.95  
\*70" Yoke.....1.98 Standard Tuners.....17.95  
\*630 Vert. output upright.....1.98 Dumont 21.25 mc. 14.95

### AUTHORIZED DISTRIBUTORS for General Electric, Kenrad, Tung-Sol, National Union, De Wald, Regal, Automatic and General Motors.

Automatic Custom-Built Radios for Plymouth, Ford, Chevrolet and many others, always in stock.  
\*We carry a Complete line of HI-FIDELITY and sound equipment. Send us your requests.

\*We also carry a complete line of popular makes of Radio Tubes at 50-10 discount. Also many other special purpose and transmitting types, and all electronic parts and equipment at lowest prices. Send us a list of your requirements for prompt quotations.  
\*Terms: 20% with order. Balance C.O.D. All prices F.O.B. NEW YORK Warehouse. Minimum order \$25.00.  
\*Write for our latest price list and Hi-Fi catalog to Dept. RN-12.

**STAN-BURN RADIO and ELECTRONICS CO.**  
(C.B.) THEATRE BLDG.  
1697 BROADWAY • NEW YORK 19, N.Y.

### ALTERNATOR-GEN. (NEA-2D)

For IKW Emergency Plant • Mobile • Amateurs • Marine Radio & Power • Test Bench & Shop Power

Output 1080VA @ 115V, 800 cy. & 24VDC @ 25A at any speed from 2400 to 4200 rpm. Speed clutch holds free, 2%. Designed to operate at 1500 rpm for FULL RATED output at 600 cy. & 12VDC @ 25A. Alternator, less clutch, 6 1/2" D x 7" lg. Overall lg. w/clutch 12". Wt. 42 lbs. Instructions furnished.  
Excellent Cond. \$1895 New... \$2495  
Used.....

### DYNAMOTORS---NEW!

Mfg.'s Surplus--All Standard Brands  
In:11V@16A Out:500V@250A.....\$19.95  
In:24V@7.6A Out:500V@250A.....\$5.95  
In:12V@3.8A Out:230V@100A.....\$8.95

25% with C.O.D. orders  
Satisfaction guaranteed F.O.B. Los Angeles

**POSSNER CO.**  
Special Apparatus Division  
1223 Venice Blvd. Los Angeles 6, Calif.

New TV Stations on the Air.....	75 July
New TV Stations on the Air.....	112 Aug.
New TV Stations on the Air.....	148 Sept.
New TV Stations on the Air.....	132 Oct.
New TV Station on the Air.....	162 Nov.
Skiatron's "Subscriber-Vision" (Graf)	58 Oct.
Televising Today's News (Peterson)	55 Jan.
The Dodge Industrial TV Camera (Ennes) .....	31 July
The Modern Booster (Carpenter)...	70 Apr.
TV Receiver for DX.....	184 Nov.
U.H.F. TV Channels.....	47 Apr.

#### SERVICE NOTES

A. C. Fields in TV Receivers (Buch- baum) .....	111 Nov
A Simple Anti-Flutter Circuit (Frieborn) .....	38 Aug.
Brightness Control in TV Receivers (Frieborn) .....	80 Oct.
Bring Your TV Set Up-to-Date (Koch)	78 Oct.
Curing a Focus Problem (Jacobson)	112 Mar.
D. C. Distribution in TV Receivers (Buchbaum) .....	48 June
Faster TV Servicing Through Circuit Tracing (Kiver) .....	54 July
G-E's Internal Magnetic Focus System .....	82 June
Keyed A.G.C. Systems (Kiver).....	48 Sept.
Know Your 1954 General Electric TV Receivers (Najork).....	63 Oct.
Know Your 1954 Sylvania TV Re- ceivers (Nelson).....	115 Nov.
Know Your 1954 Westinghouse TV Receivers (Wright).....	73 Dec.
Know Your 1954 Zenith TV Re- ceivers (Marchnic).....	59 Sept.
Know Your 1953 Du Mont "Tele- sets" (Roche) .....	67 May
Know Your 1953 Emerson TV Re- ceivers (Kutny) .....	52 Aug.
Know Your 1953 Philco TV Re- ceivers (Lerner) .....	58 June
Know Your 1953 RCA TV Receiver.	48 July
Mac's Radio Service Shop (Frye)...	60 Jan
Mac's Radio Service Shop (Frye)...	70 Mar.
Mac's Radio Service Shop (Frye)...	68 Apr.
Mac's Radio Service Shop (Frye)...	66 Aug.
Make Your Own U.H.F. Chokes (Gauss, WOEOS) .....	83 May
Meet the Snivet (Knight).....	104 Nov.
New Approach to TV Service (Hoshour) .....	194 Oct.
New Designs for 1953 (Buchbaum)	46 Jan.
Noise Immunity Circuits (Part 1) (Kiver) .....	54 May
Noise Immunity Circuits (Parts 2)...	54 June
Receiver Changes to Improve Fringe Reception (Part 1) (Stevens).....	42 Mar.
Receiver Changes to Improve Fringe Reception (Part 2) (Stevens)	48 Apr.
Service Hints on Admiral TV Sets...118	Apr.
Service Hints on Du Mont TV Sets...106	May
Service Hints on G-E TV Sets.....210	Oct.
Service Hints on Philco TV Sets...120	June
Service Hints on RCA TV Sets.....118	July
Service Hints on Emerson TV Sets...126	Aug.
Service Hints on Sylvania TV Sets...214	Nov.
Service Hints on Westinghouse TV Sets .....	178 Dec.
Service Hints on Zenith TV Sets...138	Sept.
Servicing TV Low Voltage Supplies (Lowe) .....	58 Dec.
Troubleshooting the U.H.F. Tuner (Buchbaum) .....	64 Dec.
Signal Tracing in High-Voltage TV Circuits (Liebscher) .....	50 Jan
Sound System for Your TV Set (Shields) .....	54 Feb.
The Regency U.H.F. Converter (Morris) .....	84 Dec.
The Spook—Another Weird Effect to Haunt TV (Knight).....	64 Mar.
The Standard Coil 82-Channel Tuner (Buchbaum) .....	35 Sept.
Troubleshooting TV High-Voltage Supplies (Lowe) .....	48 Aug.
TV Interference Signals (Gory).....	38 July

December, 1953

## Let MILTON S. KIVER Help You Prepare For U.H.F.-TV And...

# TELEVISION SERVICING

### Easy to TRAIN AT HOME This Practical Way!

Men with the right training in Television Servicing are in big demand... pull down big pay. T.C.I. TRAINS YOU RIGHT with easy-to-follow technical training designed by servicemen, for servicemen! You learn practical, professional type Television Servicing without leaving your present job. Included are money-making extras such as set conversion, master antenna installation, U.H.F.-TV and field servicing short cuts. You can start earning Television money after the first few lessons. You learn to test, trouble shoot and repair all types of TV sets the proven, practical way!

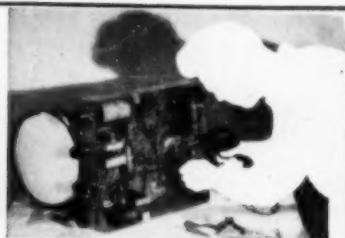
### HERE'S HOW YOU GET EXPERIENCE!

You train on your own large screen modern television receiver, furnished as part of your course. This set is yours to keep! As an optional feature you can get two weeks of actual field experience out on service jobs and on the repair bench for Chicago's largest independent servicing organization. You learn Television Servicing by actually doing Television Servicing... you get the practical know-how you need to qualify for BIG MONEY in this fast-growing field! Age is no barrier, Many TCI students are over 40!

**VETERANS!**  
T.C.I. is approved  
for G.I. training  
under Public Law  
350. Check cou-  
pon.

**ACT NOW!** Mail coupon for  
FREE Catalog and SAMPLE  
LESSON. Write TODAY!

**TELEVISION COMMUNICATIONS  
INSTITUTE**  
205 W. Wacker Dr., Dept. AV Chicago 6, Ill.



**YOU GET** and keep mod-  
ern large screen Television  
receiver.  
**YOU DO** actual testing,  
servicing, trouble shoot-  
ing and repairing

### BEGINNERS! LEARN ABOUT NEW BASIC TV COURSE!

You don't need radio experience for  
practical, home-study training in Ba-  
sic Television. Start earning money  
in TV after first few easy lessons.  
Check coupon for details.

### MAIL NOW FOR FREE BOOKLET

MILTON S. KIVER, President  
TELEVISION COMMUNICATIONS INSTITUTE  
205 W. Wacker Dr., Dept. AV, Chicago 6, Ill.  
Rush full facts on practical TV training. I  
am not obligated. Salesman will not call.

Name..... ☐ Veterans; check here  
Address.....  
City..... Zone..... State.....  
☐ BEGINNERS check here for information on  
Basic Television Course.

## DAVIS ELECTRONICS

### CHALLENGES THE TV ANTENNA MANUFACTURING INDUSTRY

#### AN OPEN LETTER:

"In the interest of PROTECTING Electronics  
TV Dealers from the huckster practices of  
releasing sales propaganda disguised as  
'technical information' WE CHALLENGE THE  
INDUSTRY TO SET UP STANDARDS.

"We believe that all technical infor-  
mation released to the trade should have  
the dignity which the phrase 'technical  
information' implies... This technical in-  
formation should come from RECOGNIZED  
INDEPENDENT RESEARCH and/or TESTING  
LABORATORIES to insure its accuracy."

Jack Moore, *Paul Moore* Sales Manager

### DAVIS ELECTRONICS DIDN'T WAIT

We foresaw what was, and is, happening in the TV Antenna Industry. We now pro-  
vide the Dealer with facts—not fiction.

Securing the actual "technical information" was a long and costly process, but we  
knew how valuable it would be for you to have.

We invite comparison with any other TV antenna that is tested by a compe-  
tent testing research institution.

TO BACK UP OUR CONVICTIONS, DAVIS SUPER-VISION ANTENNAS ARE SOLD WITH A  
DEALER NET PRICE MONEY-BACK GUARANTEE "to perform to the dealers' satisfaction."

**WE HAVE PROTECTED DEALERS:** We pro-  
vide Dealers with FACTS about the Unexcelled  
Performance of the Davis Super-Vision All-Channel  
VHF Antenna. This is contained in a NEW  
CATALOG FOLDER & TECHNICAL BULLETIN  
—and if you want to give your customers the  
finest television reception, write for your copy.

BUILT BY AMERICA'S FASTEST GROWING ANTENNA MANUFACTURER  
Copyright 1953



Trade Mark Reg. (First use)

**DAVIS ELECTRONICS** 1-45  
BOX 1247, Burbank, California  
**SIRS: RUSH INFORMATION TO ME AS CHECKED:**  
☐ Send Complete Information and Technical  
Data on New SUPER-VISION ANTENNA.  
☐ Send Name and Address of NEAREST JOBBER.  
Name.....  
Street.....  
City..... State.....

# Trav-Electric

DC to AC

## CURRENT CONVERTERS for Land...Sea...Air

JUST PLUG INTO CIGAR LIGHTER ON DASH

Change 6 or 12 Volt D. C.  
to 110 Volt A. C. - 60 cycle



Operates Test Equipment,  
All Electric Shavers

SIZE: 2"x2"x3 1/2"

**Trav-Electric MIDGET**

Model 6-11160, 60 Cycle, 10-15 Watts

**\$11.95**  
List



- OPERATES
- Test Equipment
  - Turntables
  - Lights
  - Short, Long Wave Radios
  - Portable Phonographs
  - Electric Shavers, etc.

SIZE: 2 1/2"x2 1/2"x4 1/2"

**Trav-Electric SENIOR**

Model 6-11160, 60 Cycle, 35-40 Watts

**\$15.95**  
List



- OPERATES
- Curling Irons
  - Radios
  - Turntables
  - Small Dictating Machines
  - Test Equipment
  - Electric Shaver
  - Portable Phonographs

SIZE: 4"x5"x6"

**Trav-Electric MASTER**

Model 6-51160, 60 Cycle, 40-50 Watts

**\$24.95**  
List



- OPERATES
- Wire Recorders
  - Amplifiers
  - Soldering Iron
  - Radios
  - Dictating Machines
  - Turntables
  - Small Electric Drill
  - Electric Shaver

SIZE: 4"x5"x6"

**Trav-Electric SUPER**

Model 6-71160, 60 Cycle, 60-75 Watts

**\$37.95**  
List

FULLY GUARANTEED  
See your Jobber or Dealer

## Terado COMPANY

ST. PAUL 14, MINNESOTA

In Canada Write: Atlas Radio Corp., Ltd.  
560 King St. West, Toronto 28, Ont.

Export Sales Division: Scheel International, Inc.  
4237 N. Lincoln Ave., Chicago 18, Ill. U.S.A.

Cable Address—Harsheel

TV Parts Replacement Guide..... 42 May  
TV Parts Replacement Guide..... 51 June  
TV Parts Replacement Guide..... 63 July  
TV Receiver Sensitivity (Rankin)... 76 Sept.  
TV Servicing in the Home (Blitzer).. 49 Dec.  
TV Tube Substitutions  
(Buchsbaum) ..... 50 Oct.  
Watch Those Heater Voltage  
Measurements (Frieborn) ..... 134 Sept.

## TEST EQUIPMENT

### AMATEUR

A Ham Shack Frequency Standard  
(Graham, W1VJV) ..... 56 Mar.  
A Low-Cost Crystal Calibrator  
(Countryman, W3HH) ..... 63 Aug.  
A Transistor Sine-Wave Clipper  
(Garner) ..... 50 May

### AM-FM

A Novel Probe Switch (White)... 72 June  
A Potentiometer-Decade Adapter:  
The "Decapot" (Gould)..... 178 Nov.  
A Simple Versatile Substitution  
Tester (Brewer) ..... 124 Nov.  
The Con-Vi (Graham)..... 84 Oct.  
The Oscilloscope as an A.C.-D.C.  
Voltmeter (Buchsbaum) ..... 57 July  
The Transistor D.C. Amplifier  
(Starke) ..... 82 Dec.

### AUDIO

A Low-Cost Audio Oscillator  
(Gerber) ..... 62 Jan.  
A Low Distortion Audio Signal Gen-  
erator (Jones, Jr.)..... 58 July  
A Transistorized Audio Oscillator  
(Garner) ..... 68 Sept.  
A Universal Speaker Tester (Lenson  
& Tepper) ..... 58 Mar.  
What's the Q-LC? (Philbrook).... 61 July

### MISCELLANEOUS

A Low-Resistance Ohmmeter  
(McMath) ..... 61 Apr.  
An Expanded-Scale Power Line  
Meter (Mintzer) ..... 122 Nov.  
An Oscilloscope Calibrator  
(Graham, W1VJV) ..... 70 June  
An R.F. High-Voltage Supply for  
Your CRO (Garner)..... 66 Mar.  
A Square-Wave Shaper (Jones, Jr.) 63 Sept.  
Choose the Probe to Fit the Test  
(Liebscher) ..... 40 Aug.  
Oil-Cooled Load Wattmeter (See,  
W9OCL/5) ..... 38 Feb.  
Simple Speedlamp Tester (Ferres).. 174 Oct.

### TELEVISION

Adapting V.O.M. as a Field  
Strength Meter (Robberson).... 59 Aug.  
CRT Tester-Sparker (Gnessin & Sues-  
holtz) ..... 104 Mar.  
New TV Intermittent Checker  
(Racker) ..... 56 Oct.  
Oscilloscopes—the Electronic Eye of  
the Service Technician (Kiver)... 31 Jan.  
Television Sweep Generators (Kiver) 43 Oct.  
U.H.F. Test Equipment Adapter  
(Lerner & Starks) ..... 56 Sept.  
U.H.F. TV Test Equipment (Buchs-  
baum) ..... 40 May

## EDITORIAL CONFERENCE

THE second Conference on Scientific  
Editorial Problems will be held Dec.  
27 in Boston during the annual meeting  
of the American Association for the  
Advancement of Science.

The purpose of the meet is to bring  
before the group some of the important  
problems that confront those who pre-  
pare scientific manuscripts, technical  
reports, or edit and produce scientific  
publications. The meet is open to the  
public.



**OIL CONDENSER**  
15 MFD. 600 VOLTS  
made by  
**WESTINGHOUSE**  
#CAY-481758-10

This condenser will make a perfect filter for  
WILLIAMSON amplifiers, transmitters and  
other applications where low noise and leak-  
age is necessary. Rated at 600 volts these  
condensers are now seeing duty at 1000 volts.

### A TERRIFIC VALUE

Dimensions: 4 1/2" x 2 1/2" x 2 1/2" D. 2 1/2"  
Brand new factory fresh. Made to last a lifetime.  
\$2.49 ea., 6 for \$13.50

### METERS (BRAND NEW)

Weston 3 1/2" Rd 0-150 Volts AC \$8.95  
Westinghouse 4 1/2" Square 0-15V AC \$7.95  
W.E. 3 1/2" Rd 0-10V DC 1000 ohms per V \$4.95

### FT-241-A CRYSTALS

Mfd. by W.E. Brand new

Frequency in Meg. 20.4, 20.5, 20.6, 20.7, 20.8,  
20.9, 21.2, 21.3, 21.7, 22.0, 22.1, 22.2, 22.4,  
22.7, 22.8, 22.9, 23.0, 23.3, 24.4, 24.5, 24.6,  
24.7, 24.8, 26.4, 26.9.  
\$.49 ea. or 6 for \$2.49

### VARIAC CONTROL PLATE KNOB

Type 200C 4" Diameter

1 side calibrated for 115 Volt line, other side  
calibrated for 0-135 Volts.  
\$.89 each or 3 for \$2.50

### FP. ELECTROLYTIC CONDENSERS

(Guaranteed Perfect)

Cap.	W. Volts	Price
20	450	\$4.44 or 3/1.19
40	450	\$5.54 or 3/1.49
1000	15	\$6.69 or 3/1.89
1000	25	\$8.89 or 3/2.49
8-16	450	\$5.59 or 3/1.59
40-40	450	\$8.89 or 3/2.49

**ALEXANDER MOGULL CO.,**

17 WARREN ST., NEW YORK 7, N. Y.  
Worth 4-0865

## WILLIAMSON RESISTORS

Deposited type, Low noise, 1% guaranteed tolerance.  
Matched, Brand new, Beautiful appearance, W. E.  
—licensed. Made especially for Williamson circuit.  
KIT: 2—50K 2W, 2—20K 1W, 1—47K 1W, 2—470K  
1/4W, 2—100K 1/2W. A \$6.50 net value for only  
\$4.99 P.P. Air Mail add 15c. No C.O.D. Money  
back guarantee.

### SOUTHERN ENGINEERING

Dayton Pike Rt. 5 Chattanooga 5, Tennessee

SAY YOU SAW IT IN  
RADIO AND TELEVISION NEWS

## NEW THEORY REVOLUTIONIZES VHF UHF TV ANTENNAS



### THE OCTO-TENNA

MOST POWERFUL TV ANTENNA MADE  
This antenna has been developed under a new  
theory which GUARANTEES best possible reception  
anywhere on every frequency range above 55 mcy-  
cles with the lowest interference to signal ratio.  
EASY TO ASSEMBLE \* MOST CONVENIENT  
TO INSTALL \* LOW WIND RESISTANCE  
The insulator is practically indestructible, made  
from the best grade laminated wood well preserved.  
Patent pending.

WRITE NOW FOR MORE INFORMATION

**C. R. DERR CO.**

1018 Taylor Avenue Vallejo, Calif.

RADIO & TELEVISION NEWS

## Electronic Light Control (Continued from page 81)

plate end of the resistor will be negative with respect to the other end.

The second amplifier tube,  $V_{1B}$  is hooked up so that its control grid is connected through a large resistor,  $R_2$ , directly to the negative end of the plate load resistor of the first amplifier tube  $V_{1A}$ , and its cathode is connected to the positive end of the same resistor. Because of the large drop across  $R_2$  when no light shines on the photoelectric cell, the second amplifier tube will be biased beyond cut-off. Inspection of the schematic will disclose a large condenser between the grid and cathode of this tube. The condenser and the resistor, in series with the grid, form a time delay circuit to slow down the action of the circuit. In this way momentary light flashes such as lightning, etc. will not turn the controlled lights off.

Since there is no plate current flowing through the second amplifier tube,  $V_{1B}$ , the relay coil is not energized, the contacts are closed, and the controlled lights are on.

Regarding the action when light strikes the phototube, the presence of a bright light on the phototube cathode causes the tube to pass a large current and thus develops a large voltage across the phototube's load resistor  $R_1$ . This biases the first amplifier tube,  $V_{1A}$ , to beyond cut-off. No plate current through the tube means that no voltage drop will be developed across the plate load resistor,  $R_1$ , and no bias will be developed on the second amplifier tube,  $V_{1B}$ .

When the second amplifier tube,  $V_{1B}$ , has no bias, it draws a large plate current through the relay coil, the relay is picked up, the contacts are opened and the controlled lights are turned off.

-30-

## PHOTO CREDITS

Page	Credit
45, 47, 73, 74, 76, 128, .....	Westinghouse Electric Corporation
49, .....	Radio City Products Company
56, .....	Gately Development Laboratory
62, 63, .....	CBS-Hytron
64 (top), .....	P. R. Mallory & Co., Inc.
64 (center), .....	Granco Products, Inc.
64 (bottom), .....	Standard Coil Products Co.
65 (top), .....	Kingston Products
71, .....	Carl Fischer, Inc.
82, 83, 140, .....	Raytheon Mfg. Co.
84, 85, .....	Regency Division, I.D.E.A., Inc.
154, .....	Howard W. Sams & Co., Inc.

## ADDENDUM

In regards to the "Terri-Loopstick Crystal Receiver" (July 1953 issue) the circuit as published is correct, although reports indicate some readers are having difficulty. One important point not covered in the article is that the phones to be used should be at least 2000 ohms d.c. resistance or up to 24,000 ohms impedance. Low impedance or crystal phones will not work.

IT'S READY NOW!

SEND FOR YOUR GIANT NEW

# Concord Catalog

1954  
EDITION

IT'S GOT  
EVERYTHING!

- Standard Lines
- Special Buys

IT'S FREE!

Concord Radio

55 Vesey Street, New York 7, N. Y.

Phone DLgbr 9-1132

SENSATIONAL  
XMAS GIFT  
VALUE!

SETCHEL CARLSON  
DE LUXE  
TABLE RADIO

\$29.50

- POWERFUL 6 TUBE CIRCUIT
- 10" PM SPEAKER
- THREE BANDS

Made to Sell for \$99.50!

Offers all the advantages of a large size console set in minimum space and for very moderate cost. Features include: 3 bands, 540-1600 kc, 2-4-6-6 Mc, 6-17-6 Mc. Well-designed five tube plus rectifier circuit. Tubes: 2-12BA6, 12BE6, 12AT6, 6V6, 6X4. Power output is 3 watts undistorted to 10" high quality PM speaker. Has provisions for external antenna, phono pickup, and power to phono. AC only. Extra plug for use on 220 volts AC (export). Handsome cabinet-maker's hand finished genuine Mahogany veneer cabinet 21 1/4" L x 11 1/4" H x 6 1/4" D. Available in Blonde or Mahogany finish. Shpg. Wt. 19 lbs.

Stock No. F-5130M Mahogany Net \$29.50  
Stock No. F-5130B Blonde Net \$32.50

CONCORD RADIO, 55 Vesey St., New York 7, N. Y. Dept. 94-12  
Send Giant New FREE Concord Catalog at once to:

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

BELOW WHOLESALE!

## CONDENSER KIT

TEN (10) Popular multiple section, PP Electrolytics. Twist-prong mts. Capacities up to 50 mfd. Voltages from 25 to 450 V. Fresh stock. These are quality products of the industry's leaders! Wt. 3 lbs.

STOCK NO. L103—KIT OF 10

\$2.49 EACH \$2.29 EACH LOTS OF 3

## HARDWARE ASSORTMENT

FIVE (5) POUNDS of assorted screws, stampings, washers, bushings and brackets. A real grab bag! Many hard to find items—some hard to use. You are bound to find many useful pieces in this large assortment. Fresh stock. SHIPPING WT. 7 LBS.

STOCK NO. L104

\$1.89 EACH \$1.69 EACH—LOTS OF 3

## INSULATED RESISTOR KIT

100 quality insulated carbon resistors at the lowest price in years! All finest grade color-coded 1/2 and 1-Watt sizes. You can't lose by stocking up at this low, low price. Shipping Wt. 2 lbs.

STOCK NO. L105

\$1.39 EACH \$1.19 EACH—LOTS OF 6

12" P.M. SPEAKER \$3.49 (See our other advertise)  
70" DEFLECTION YOKE 1.29  
MALLORY INDUCTUNER 2.49 (ment this issue for details)

Write for Additional Listings  
INCLUDE POSTAGE—EXCESS PROMPTLY RETURNED

TERMS: F.O.B. N.Y.C.—Minimum Order \$3.00—25% Deposit on C.O.D. Orders. SAVE C.O.D. CHARGES—REMIT IN FULL PLUS POSTAGE. EXCESS PROMPTLY REFUNDED. SUBJECT TO PRIOR SALE.

PART M MART  
ROCKVILLE CENTER L. I., N. Y.

An Ideal Christmas Gift  
that lasts forever!

## LEARN CODE and Theory

\$6.95 up

EASY,  
FAST HOME STUDY!

Pass Commercial and Amateur  
Code Exams, Amateur Theory  
Exams, for Your FCC License!

78 RPM

## 4 AMECO Courses Available:

No. 1—NOVICE CODE COURSE. You get and keep 10 recordings (alphabet through S, W, P, M, ..). Includes typical FCC type code exams. Free instruction book on learning how to send and receive code the simplest, fastest way; plus charts to check your receiving accuracy; plus an album; all for the low price of only \$7.95

No. 2—SENIOR CODE COURSE—You get and keep everything given in the Novice Course except that you get 22 recordings (alphabet through I, S, W, P, M, ..), plus typical FCC type code exams for General class and 2nd class commercial telegraph licenses. All this for only \$12.95

No. 3—COMPLETE RADIO THEORY COURSE. A complete, simplified home study theory course in radio covering the Novice, Technician, conditional and general classes—all under one cover—with nearly four hundred typical FCC type questions to prepare you for license exam. No technical background required. You also get, FREE, one year of consultation and a guide to setting up your own Ham station. All for the amazing low, low price of \$6.95

No. 4—NEW ADVANCED COURSE. Prepares novice operators for the amateur general class and second class commercial license tests. Contains 12 recordings (S through I, S, W, P, M, ..) PLUS the complete code book—PLUS typical FCC code examinations for general and commercial tests. ALL for only \$6.95

Distributor Inquiries Invited!  
FREE LITERATURE AVAILABLE

Sold at leading distributors  
everywhere or  
write to:  
Dept. 94-12

AMERICAN ELECTRONICS CO.  
1203 Bryant Ave., New York 59, N. Y.



## BELOW WHOLESALE!

### 12" P.M. SPEAKER

A quality speaker made by R.C.A. for use in the finest sets. Alnico V centerless ground magnet. Seamless cone. Extended Frequency Range. Voice coil 3.2 Ohms. Maximum Power Output 10 Watts. Fresh stock. WT. 3 LBS. STOCK NO. L 106.



**\$3.19 EA.**  
**\$3.49 EACH** LOTS OF 3

### 70° DEFLECTION YOKE

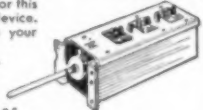
Latest design focus corrected 70° yokes at lower than wholesale cost. Can be used on all CR tubes up to 21". Inductances 10.6 mh. Horizontal; 44 mh. Vertical. Will replace most 8 to 14 mh. yokes now in use.

**95c EA.** SHIPPING WT. 3 LBS. STOCK NO. L 107

LOTS OF 3 **\$1.29 EACH**

### MALLORY INDUCTOR

Way below wholesale cost for this popular 3-gang tuning device. Use as replacement or in your own designs for TV and FM receivers and boosters. Continuous tuning from 52-120 mc and 175-216 mc with 4 turns of shaft. Size, 4 1/4" x 2 1/4". Shaft length, 3". SHIPPING WT. 3 LBS.



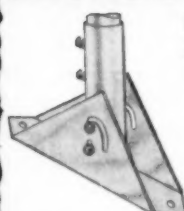
**\$2.49 EACH** **\$2.19 EA.** LOTS OF 3 STOCK NO. L 108

CONDENSER KIT **\$2.49** (See Our Advertisement)  
HARDWARE ASST. **1.89**  
RESISTOR KIT **1.39** this issue for details

Write for Additional Listings  
INCLUDE POSTAGE—EXCESS PROMPTLY RETURNED  
TERMS: F.O.B. N.Y.—MINIMUM ORDER \$3.00—25% Deposit on C.O.D. Orders. SAVE C.O.D. CHARGES—REMIT IN FULL PLUS POSTAGE. EXCESS PROMPTLY REFUNDED. SUBJECT PRIOR SALE.

**PART M MART**  
ROCKVILLE CENTER L. I., N. Y.

## South River ★ NEWS ★



For ONE-MAN  
ANTENNA Roof  
Installations  
**ROOF  
MOUNT**  
Model RM-15

Newly improved model enables installation man to "walk up" antenna and mast from horizontal to vertical position where they then drop and lock securely. Man is then free to guy the mast on any 10 ft. or less installation. (May also be used for higher installations.)

Features 5 1/2" long, heavy gauge steel mast holder to accommodate masts up to 1 1/2" O.D.

Embossed at all critical points for extra strength.

Heavily plated for rust resistance.

Write for new 1953 catalog.

In Can.: A.T.R. Armstrong Co., Toronto

**SOUTH RIVER METAL  
PRODUCTS CO., INC.**  
SOUTH RIVER, N. J.

PIONEER AND OUTSTANDING PRODUCER  
OF FINEST LINE OF ANTENNA MOUNTS

## Classified

Rate 50c per word. Minimum 10 words

### RADIO ENGINEERING

COMPLETE radio, electronics theory & practice: television; broadcasting; servicing; aviation, marine, police radio. 12 or 18 months. Catalog. Valparaiso Technical Institute, Dept. N, Valparaiso, Ind.

### FOR SALE

ISOLATION transformer 35w 117v sec. 117 or 135 plus 6.3v 45a tap. 3 lbs. \$2.45 plus postage. Send for flyer. Surplus bought. Empire Electronics Co., 409a Ave. L, Brooklyn 30, N. Y.

DIAGRAMS—Radio \$1.00; record changers, recorders \$1.25. Television with service data \$2.00. Where model unknown, give part numbers. Kramer's Radio Service, Dept. 853, 36 Columbus Ave., New York 23, N. Y.

TUBES and equipment bought, sold, and exchanged. For action and a fair deal, write B. N. Gensler, W2LNI, 136-F Liberty, New York 6, N. Y.

TAPE Recorders, Tapes, Accessories. Unusual Values. Dressner, 624-R East 20th St., N.Y.C. 9.

FREE, Bargain List, tubes bought, sold. Write Mark, Box 14, New York City 72.

2000 TOOLS, supplies, novelties (domestic, imported). All Tools, Box 268-R, New York 5.

ALUMINUM Tubing, angle and channel. Plain and Perforated Sheet. Willard Radcliff, Fostoria, Ohio.

RECONDITIONED TV sets, \$30. Jones, 1115 Rambler Ave., Pottstown, Pa.

COIN-OPERATED Radio. Route in Fla. Good income guaranteed. Write to P.O. Box 1443, St. Augustine, Florida.

DISCONTINUED business. Send addressed stamped envelope for list of Riders Manuals and Equipment. Marcus H. Moses, 35 Hamilton Place, New York 31.

MARINE Radio Repair Shop, lot and building. All necessary equipment. Approved for Naval Work. For further information write to Reliance Armature Works, 1721 E. Pacific Coast Hwy., Wilmington, Calif. Full Price, \$10,000.

MINIFON. Pocket recorder, Brand new. Accessories. Save, \$115. Soehngen, B. 465, RRS, Dayton 3, Ohio.

MULTIPLE Duplication tape, disc. Melers, 218 W. Olive, Fort Collins, Colorado.

USED Televisions \$30 up. W4API 1420 South Randolph, Arlington, Virginia.

TV-FM antennas. All types including UHF. Mounts, accessories. Lowest prices. Wholesale Supply Co., Dept. H, Lunenburg, Mass.

### WANTED

AN/APR-4, other "APR-" "ARK-" "TS-" "IE-" ARC-1, ARC-3, ART-13, everything surplus; Tubes, Manuals, Laboratory equipment. Describe, price in first letter. For Sale: Reconditioned Watthour Meters, four for \$10.00. Engineering Associates, 434 Patterson Rd., Dayton 9, Ohio.

WILL buy all ART-13/type T-47A \$200.00; ART-13/type T-47. \$150.00; BC-348 unmodified \$65.00; BC-348 modified \$50.00; APN-9 \$200.00; ARC-3 complete \$600.00; RTT Receivers \$300.00; ARC-1 \$300.00; BC-312 \$60.00; BC-342 \$60.00. Ship via Express C.O.D., subject to inspection to: H. Finnegan, 49 Washington Avenue, Little Ferry, N. J.

### CORRESPONDENCE COURSES

USED Correspondence Courses and Educational Books Bought, Sold, Rented. Catalog Free. Educational Exchange, Summerville, Ga.

### MISCELLANEOUS

SPEAKERS repaired, wholesale prices, guaranteed workmanship. Amprite Speaker Service, 70 Vesey St., New York City 7.

TAPE Recording Exchange for education, amusement. Foreign Members. World Tape Pals, Box 9211, Dallas, Texas.

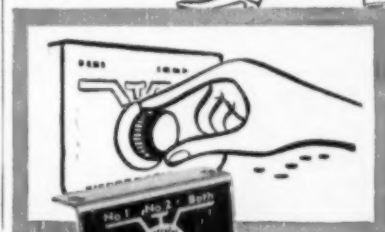
TEST Equipment Repaired and Calibrated by Factory Staff. All makes Solar, Simpson, Triplett, Heath, etc. Immediate service Douglas Instrument Laboratory, 176 Norfolk Ave., Boston 19, Mass.

COMPLETE Speaker Repair Service. Quality Workmanship and Parts. Charles B. Albright, 12373 Pierce St., Pacoima, Calif.



## dual speaker business is good

The trend to dual speakers is greatly expanding. That's why you'll want to have the most profitable accessories on hand (or know which are fastest-for-servicing) when this business comes your way. This Centralab switch is a profitable "middle-man" everyone likes!



## this Centralab dual switch kit makes it better!

All parts (except mounting holes) in one box—nothing else to buy

You get the complete assembly for switching between dual speakers such as auto rear seat and front seat speakers, including etched dial-mounting plate and complete installation instructions. Listener selects either speaker or both. Profitably installed, you forget it! Your Centralab distributor has dual switch mounting kits on hand—order a couple NOW.

## Centralab

CENTRALAB  
A Division of Globe-Union Inc.  
910-L E. Keefe Ave., Milwaukee 1, Wis.  
Please send me Catalog 28 for additional technical data on dual switch kits.

Name \_\_\_\_\_  
Firm \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



over **99%\***  
hit the bull's-eye  
for quality!

that's why we call

**Federal**  
PICTURE TUBES

**"BEST-IN-SIGHT"**

Thousands of famous-name picture tubes were quality-tested by a famous-name TV set manufacturer.\* When the scoring was over, Federal led all the brands tested... with an "OK" on over 99% of its tubes!

Here's proof, Mr. Serviceman, that it pays to replace with *Federal*... here's assurance of top performance... of less time wasted on call-backs... of more profit per tube replaced!

Federal quality brings to servicemen a tremendous opportunity to create customer-goodwill... to build steady replacement business.

Federal quality *stands by* servicemen, because it *stands up* in service... backs up their years of experience and know-how... their *trained* judgment. That's one of many big reasons why more and more servicemen are specifying Federal "Best-in-Sight" picture tubes.

Join the trend today... ask your Federal Distributor about the popular-size line that takes care of over 90% of all TV replacements...! For information, write to Dept. N-359A.

**"Federal always has made better tubes"**

**Federal**  
**Telephone and Radio Company**

100 KINGSLAND ROAD, CLIFTON, N. J.

In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.  
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

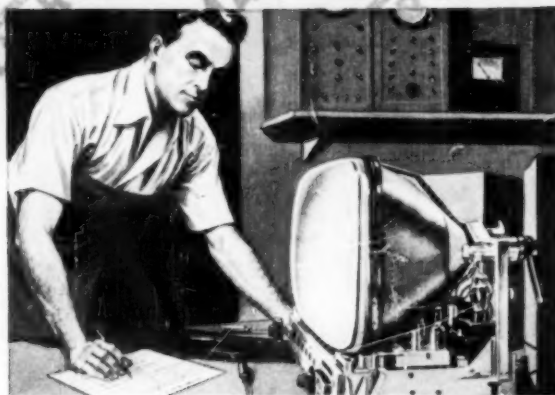


**Get Your Copy of  
Federal's  
TV Picture Tube  
DATA BOOK**

12-page booklet with information on interchangeability, basing diagrams, bulb outlines, dimensions, characteristics. Address your inquiry to Dept. listed above.



Depend on Mallory  
for  
Approved Precision Quality



## Put More Service Life Into All Your Jobs



Whenever Mallory FP Capacitors go into a service job, your customers can be sure of more hours of entertainment . . . you can be sure the job is done right . . . once and for all. For all your service work, you'll get better results with Mallory Capacitors. They are engineered to meet the electrical requirements of any TV or radio set. They'll give performance that is equal to . . . and often better than . . . the original equipment.

What's more, Mallory FP Capacitors are the only fabricated plate capacitors available to the replacement market. You can depend on them to give longer life at higher temperatures and greater ripple currents. They will give trouble-free performance at 185° F. (85° C.).

Any way you look at it, dependable service work builds satisfied customers. The next time you order capacitors, ask for Mallory FP's. They will put an end to call-backs due to capacitor failure . . . yet they cost no more.



For plastic tubular replacements, specify Mallory Plascaps®. Their improved moisture proofing will put an end to shorts. No off-center cartridges . . . leads are permanently secured.

# MALLORY

CAPACITORS • CONTROLS • VIBRATORS • SWITCHES • RESISTORS  
RECTIFIERS • POWER SUPPLIES • FILTERS • MERCURY BATTERIES  
APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA